WARREN COUNTY SCHOOL DISTRICT

PLANNED INSTRUCTION

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
Certification verified by the WCSD Human Resources Department: ☒Yes ☐No

WCSD STUDENT DATA SYSTEM INFORMATION

Course Level: Academic
Mark Types: Check all that apply.
☒F – Final Average ☒MP – Marking Period ☒EXM – Final Exam

GPA Type: ☐ GPAEL-GPA Elementary ☐ GPAML-GPA for Middle Level ☒ NHS-National Honor Society
☒ UGPA-Non-Weighted Grade Point Average ☒ GPA-Weighted Grade Point Average

State Course Code: 02106
To find the State Course Code, go to State Course Code, 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.6 CC.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.9 F-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.9 F-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.10 F-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: 30^o, 45^o, 60^o	CC.2.2.HS.C.7 G-SRT.6	MP1
Find reference angle measures	CC.2.2.HS.C.7 G-SRT.6	MP1

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Find exact values of the six trigonometric functions of a quadrantal angle	CC.2.2.HS.C.7 G-SRT.6	MP1
Find exact trigonometric function values of expressions using reference angles	CC.2.2.HS.C.7 G-SRT.6	MP1
Evaluate trigonometric expressions using function values of special angles	CC.2.2.HS.C.7 G-SRT.6	MP1
Evaluate trigonometric expressions using coterminal angles to find function values	CC.2.2.HS.C.7 G-SRT.6	MP1
Find an angle measure given an interval and a trigonometric function value	CC.2.2.HS.C.7 G-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.7 CC.2.3.HS.A.14	MP1
Solve a right triangle given an angle and a side	CC.2.3.HS.A.7 G-SRT.8	MP1
Solve a right triangle given two sides	CC.2.3.HS.A.7 G-SRT.8	MP1
Solve real-world and mathematical problems involving the angles of elevation and depression	CC.2.3.HS.A.7 G-SRT.8	MP1
Solve real-world and mathematical problems involving bearing	CC.2.3.HS.A.7 G-SRT.8	MP1
Solve real-world and mathematical problems using trigonometry to measure a distance	CC.2.3.HS.A.7 G-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.7 F-TF.1	MP2
Solve real-world and mathematical problems applying arc length	CC.2.3.HS.A.14 F-TF.1	MP2
Solve real-world and mathematical problems applying the area of a sector	CC.2.3.HS.A.14 F-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

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Solve real-world and mathematical circular function problems modeling the angle of elevation and lengths of line segments	CC.2.2.HS.C.7 CC.2.3.HS.A.7 F-TF.1	MP2
Solve real-world and mathematical problems using linear and angular speed	CC.2.2.HS.C.7 F-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.6 CC.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.7 G-SRT.7	MP3

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
Solve real-world and mathematical problems applying the cosine of sum and difference identities	CC.2.2.HS.D.6 CC.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.2 CC.2.2.HS.D.6 CC.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 (2Θ) 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 (2Θ)	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.2 CC.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.2 CC.2.2.HS.D.6	MP3
Use a sum-to-product identity to write an equivalent trigonometric expression	CC.2.2.HS.D.2 CC.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.7 CC.2.2.HS.D.2 CC.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.7 F-TF.7	MP3
Find inverse function values (degree-measured angles)	CC.2.2.HS.C.7 F-TF.7	MP3
Find inverse function values with a calculator	F-TF.7	MP3

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
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.2 CC.2.2.HS.D.6 CC.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.10 F-TF.7	MP4
Solve an inverse trigonometric equation using an identity	CC.2.2.HS.D.10 F-TF.7	MP4
Apply the Law of Sines to solve a triangle: (SAA), (ASA)	G-SRT.10 G-SRT.11	MP4
Find the area of a triangle: (SAS), (ASA)	G-SRT.10 G-SRT.11	MP4
Solve real-world and mathematical problems using the Law of Sines	G-SRT.10 G-SRT.11	MP4
Solve the ambiguous case of the Law of Sines: No such triangle, One triangle, Two triangles	G-SRT.10 G-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.10 G-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.10 G-SRT.11	MP4

Performance Indicator	**PA Core Standard and/or Eligible Content**	**Marking Period Taught**
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