Unit 4: Trigonometry

Content Area: **Math**
Course(s):
Time Period:
Length: **30 Days**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Trigonometry

Learning Objectives

- (+) Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★
- (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
- (+) Prove the Pythagorean identity sin2 (θ) + cos2 (θ) = 1 and use it to find sin(θ), cos(θ),or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.
- (+) Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle
- (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosines, and tangent for π−x, π+x, and 2π–x in terms of their values for x, where x is any real number.

Essential Skills

- Choose trigonometric functions to model periodic phenomena with amplitude, frequency, and midline.
- Prove the addition and subtraction formulas for sine and cosine.
- Prove the Pythagorean identity sin2 (θ) + cos2 (θ) = 1.
- Understand radian measures of an angle as an arclength on the unit circle.
- Use special right triangles to develop the unit circle.
- Use the addition and subtraction formulas to solve problems.
- Use the Pythagorean identity to find sin(θ), cos(θ),or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.

Standards

MATH.9-12.F.TF.A.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
MATH.9-12.F.TF.A.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.
MATH.9-12.F.TF.B.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
MATH.9-12.F.TF.C.8	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
MATH.9-12.F.TF.C.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

Instructional Tasks/Activities

- Co-Function Identities
- Even Odd Identities
- Multiple-Angle Identities
- Project: Spaghetti String Graphs
- Sum and Difference Identities
- Topic #1: Angles and angle measure
- Topic #2: Radians and Degrees
- Topic #3: Right triangle trigonometry and the Unit Circle
- Topic #4: Trig functions of any angle
- Topic #5: Graphing trig functions
- Topic #6: Simple trig equations
- Topic #7: Fundamental identities
- Topic #8: Equations with factoring and fundamental identities

Assessment Procedure

- Class Discussions
- Classroom Total Participation Technique
- Classwork/homework
- Compare/Contrast Journals
- DBQ
- Electronic Active Responders
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Identify the Error Problems

- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Quizzes/Tests
- Response and Analysis Questions
- Rubric
- Teacher Collected Data
- Teacher Observations
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Desmos
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify
- TI-Nspire CX-Cas activities throughout the unit as appropriate

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should

be used in addition to the following suggestions.

Special Education

- 1. Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)
- 2. Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- 3. Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- 4. Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- 5. Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- 6. Use project-based science learning to connect science with observable phenomena.
- 7. Structure the learning around explaining or solving a social or community-based issue.
- 8. Provide ELL students with multiple literacy strategies.
- 9. Collaborate with after-school programs or clubs to extend learning opportunities.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time

- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Honors students will be expected to create the unit circle from scratch. From here, we move forward into trigonometric identities where students will be challenged to provide detailed proofs for each

identity utilize proven identities to solve trigonometric equations. The unit is concluded with an overview of the laws of sine and cosine, where honors students will again be expected to perform complex analysis to solve some of the most difficult application problems from the textbook mentioned above.

Resources

- http://www.corestandards.org/the-standards/mathematics

- https://njctl.org/courses/math/pre-calculus/
- Infinite Pre-calculus