

Unit 5: Trigonometry
Geometry
8 Class Meetings
Revised May 2023

Essential Questions

- How can you use trigonometry to solve real world problems?

Enduring Understandings with Unit Goals

EU 1: Pythagorean Theorem can be used to find the missing side of a right triangle.

- Apply the Pythagorean Theorem and it's converse to solve and classify a triangle

EU 2: Special right triangles have properties that allow their side lengths to be determined using the ratios of the side lengths.

- Use the special right triangle ratios in order to find side lengths

EU 3: Trigonometric relationships can be used to solve right triangles.

- Create equations to solve right triangles
- Apply trigonometric equations to real world situations using angles of elevation and depression.

Standards

Common Core State Standards:

- **HSG.SRT.B.4:** Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
- **HSG.SRT.C.7:** Use the relationship between the sine and cosine of complementary angles.
- **HSG.SRT.C.8:** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

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Unit Content Overview

1. The Pythagorean Theorem and Its Converse

- Use the Pythagorean Theorem
- Converse of the Pythagorean Theorem
- Classifying a triangle

2. Special Right Triangles

- Ratios of 45-45-90 triangles
- Ratios of 30-60-90 triangles

3. Trigonometry

- Writing trigonometric ratios
- Using trigonometric ratios to find a missing side
- Using trigonometric ratios to find a missing angle

4. Angles of Elevation and Depression

- Identify and use angles of elevation and depression to solve for missing values

Interdisciplinary Connection:

- Language Arts - Word Problems
- Science – Word Problems

Daily Learning Objectives with *TWPS Activities*

Students will be able to...

- Apply the Pythagorean Theorem and its converse
 - *When should you use Pythagorean Theorem?*
- Find missing side lengths using the properties of 45-45-90 and 30-60-90 triangles
- Write trigonometric ratios for various right triangles
 - *What process do you use to determine whether you are looking at a Sine, Cosine, or Tangent Function?*
- Solve equations involving trigonometric ratios to find missing sides
- Calculate the inverse of trigonometric ratios to find missing angles
- Solve real world problems using angles of elevation and depression
 - *What are some real world scenarios where you will use trigonometry?*

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Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Whole-group instruction
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Cumulative Homework
- Visuals to support instruction
- Small group instruction
- Pre-teaching and reteaching

EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Daily Do Now
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Cumulative Homework
- Performance Task – Flag Pole
 - Problem Solving Rubric

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SUMMATIVE ASSESSMENTS:

- Edulastic Quiz – EU 1, EU 2
- Unit 5 Test – EU 1, EU 2, EU 3
- Performance Task – Flag Pole

Unit Task

Unit Task Name: Flag Pole

Description: Students will use information learned in this unit about how Pythagorean Theorem can be used to find the lengths of the sides or the hypotenuse of a right triangle (EU 1), how special right triangles have properties that allow their side lengths to be determined using ratios (EU 2), and how the relationship of trigonometric ratios can be used to find a missing side of a right triangle (EU 3), in order to find the height of the flag pole outside of MSMHS. Students will be given a protractor, straw, string, and paperclip and asked to work in groups of two or three to create a clinometer in order to measure an angle of elevation. Students will take their clinometer outside with measuring sticks and will need to brainstorm ways to use their materials and the information they have learned about angles and trigonometry in order to find the height of the MSMHS flag pole. Once they have taken all of their measurements, students will come back inside to do calculations to come up with a final answer. Students will need to write a 1-page reflection about the activity that details how they made their clinometer, what measurements they took outside, what calculations they did, and what types of errors they could have made. Students will work on the project together, but write individual reflection papers.

Evaluation: Problem Solving Rubric

Unit Resources

- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Edulastic
- Kahn Academy
- Gimkit
- Quizizz
- Individual Whiteboards
- 2 Truths & One Lie
- State Common Core Standards Transition Tasks
- Online resources