Unit 08 Right Triangles and Trigonometry

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 3**
Length: **3 weeks**
Status: **Published**

Brief Summary of Unit

Students will prove and use Theorems involving similarity. They will also define trigonometric ratios and solve problems involving right triangles.

Revision Date: July 2024

Standards

Students will analyze geometric designs which connects to various cultures. Embracing the diversity within society incorporates the following:

Amistad Commission

This unit also reflects the goals of the Department of Education and the Amistad Commission including the infusion of the history of Africans and African-Americans into the curriculum in order to provide an accurate, complete, and inclusive history regarding the importance of of African-Americans to the growth and development of American society in a global context.

Asian American and Pacific Islander History Law

This unit includes instructional materials that highlight the history and contributions of Asian Americans and Pacific Islanders in accordance with the New Jersey Student Learning Standards in Social Studies.

New Jersey Diversity and Inclusion Law

In accordance with New Jersey's Chapter 32 Diversity and Inclusion Law, this unit includes instructional materials that highlight and promote diversity, including:

economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance.

ELA.K-12.2	Adapting Communication: Adapting communication in response to the varying demands of audience, task, purpose, and discipline.
ELA.K-12.3	Valuing Evidence in Argumentation: Constructing viable claims and evaluating, defending, challenging, and qualifying the arguments of others.
ELA.K-12.4	Building Knowledge: Building strong content knowledge and connecting ideas across disciplines using a variety of text resources and media.
MATH.9-12.G.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.
MATH.9-12.G.SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MATH.9-12.G.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
MATH.9-12.G.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
TEC.K-12.8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual society, and the environment.
WORK.K-12.9.1	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.
WORK.K-12.9.2	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.

Essential Questions

- How can right triangle trigonometry be used outside of the classroom?
- What is the purpose of learning about the properties of right triangles?
- Why is learning trigonometry useful?

Enduring Understandings

- Special Right Triangles are similary and have side lengths that are in proportion.
- The Pythagorean Theorem describes the relationship between the sides of a right triangle.
- Trigonometric ratios of two sides of a right triangle can be used to solve real world problems.

Students Will Know

- How to use angles of elevation and angles of depression to solve problems.

- How to use the properties of 30-60-90 and 45-45-90 triangles.
- How to use the Pythagorean Theorem and its converse.
- How to use the sine, cosine and tangent trigonometric ratios to determine the side lengths and angle measures.
- The relationship between and sine and cosine of complementary angles.

Students Will Be Skilled At

- Applying their knowledge of Sine, Cosine and Tangent to solve for missing lengths.
- Identifying Pythagorean triples.
- Knowing the ratios of the lengths of 30-60-90 and 45-45-90 triangles.
- Knowing three Trigonometric ratios: Sine, Cosine and Tangent.
- Solving a Right triangle.
- Using angle of depression and angle of elevation in real world problems.
- Using inverse Trigonometric functions to find missing angles.
- Using the Pythagorean Theorem.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Albert/AP Classroom and/or Big Ideas Math unit assessments
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

Unit 8: Chapter 9, Right Triangles and Trigonometry (2 days per topic, 2 days practice, 2 days review, 2 days assessment for 14 days)

- Pythagorean Theorem 9.1
    - Discuss Pythagorean Theorem
    - Find Pythagorean triples
    - Use Pythagorean Theorem to find lengths, rationalize and find approximate value
    - Use Converse of Pythagorean Theorem to classify triangles
- Special Right Triangles 9.2
    - Use similar triangles to find ratio of side lengths for 45-45-90 and 30-60-90 triangles
    - Solve Special Right triangles for missing side lengths
- Sine, Cosine, Tangent Ratios 9.4 and 9.5
    - Introduce ratios, find Trig ratios of an acute angle in a Right Triagle
    - Use Trig Ratios to set up a proportion and solve for a missing side
    - Angle of Elevation and Angle of Depression, real world models
    - Sine and Cosine of Complementary Angles, write sine expression in terms of cosine and vice versa
- Solving Right Triangles 9.6
    - Use Inverse Trig Ratios to find missing angle
    - Use embedded graphing calculator and change mode to degrees from radians
    - Solve the Right Triangle given two side lengths
    - Solve the Right Triangle given one side length and one acute angle
    - Use real world situations

Materials

Core instructional materials: Core Book List including Big Ideas Math Common Core Geometry

Supplemental materials: Khan Academy, Edia, DeltaMath

- District approved textbook and ancillary materials
- Online resources: Khan Academy, IXL, Delta Math, Edia, Geogebra
- Teacher created activiites
- Teacher created notes

Suggested Strategies for Modifications

Possible accommodations/modification for CP.