

# Unit 03: Right Triangles

Content Area: **Template**  
Course(s):  
Time Period: **Full Year**  
Length: **FY**  
Status: **Published**

## Standards Alignment

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### New Jersey Student Learning Standards

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MA.G-SRT	Similarity, Right Triangles, and Trigonometry
MA.G-SRT.A	Understand similarity in terms of similarity transformations
MA.G-SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MA.G-SRT.B	Prove theorems involving similarity
MA.G-SRT.B.4	Prove theorems about triangles.
MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
MA.G-SRT.C	Define trigonometric ratios and solve problems involving right triangles
MA.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.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
MA.G-SRT.D	Apply trigonometry to general triangles
MA.G-SRT.D.9	Derive the formula $A = (1/2)ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
MA.G-SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.
MA.G-SRT.D.11	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

### Integration of Career Readiness, Life Literacies and Key Skills

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CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.

CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

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## **Technology / Integration of Computer Science and Design Thinking**

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.

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## **Interdisciplinary Connections: NJSLs for ELA, Social Studies, Science and/or Math Section**

LA.K-12.NJSLSA.R	Reading
LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.RI.8.3	Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories).

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## **Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy**

see Crosswalks

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## **21st Century Life and Careers**

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## **Stage I: Desired Results**

## Transfer/Overview/Rationale

### Transfer / Overview / Rationale

#### Unit Rationale

The purpose of this unit...

**Unit four is about right triangles and the relationships that exist between its sides and angles. Students apply their understanding of similarity, from unit three, by using the Pythagorean Theorem as well as trigonometric functions to justify and prove right triangle relationships.**

## Meaning

## Essential Questions

Essential Questions

- How can the Trigonometric Ratios be applied to real-life situations?
- How is Similarity related to the Trigonometric Ratios?
- How do you find a side length or angle measure in a right triangle?

## Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Trigonometric ratios can apply to real-life situations.
- Trigonometric functions explore concepts relating right triangles

## **Acquisition (Student Learning Objectives)**

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### **Knowledge**

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Knowledge

Students will know...

Definitions/Formulas:

- Pythagorean Theorem
- Distance formula
- Special Right triangles

Concepts:

- State and apply the Pythagorean Theorem and its converse.
- Find the distance between two points by using the distance formula.
- Simplify radicals.
- Solve problems involving right triangles and special right triangles (30-60-90 and 45-45-90). Describe and apply the relationships between the sides of special right triangles.
- Find the missing parts of a right triangle using trigonometric and inverse trigonometric functions.

### **Skills**

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Skills

Student will be skilled at ...

- Identify and apply basic definitions of geometry
- Compare different angles and their measurements

- Identify parts of an angle
- Classify angles by their measure.
- Apply the pythagorean theorem to triangles in order to determine congruence
- Utilize the distance formula
- Demonstrating how to simplify radicals
- Utilize the inverse trigonometric functions

## **Stage 3: Learning Plan**

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### **Resource and Mentor Texts**

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Resources and Mentor Texts

**Google**

→ **Classroom**

→ **Docs**

**Pinterest**

**YouTube**

**Kuta Software**

**Kahoot**

IXL

Prentice Hall Geometry textbook

Pacemakers Geometry textbook

AGS Geometry textbook

Graphing calculator

<http://teachinghighschoolmath.blogspot.com/2015/01/similar-triangles-worksheet-with-gr.html>

<https://www.teacherspayteachers.com/Product/Exterior-Angle-Theorem-Maze-Solving-Equations-2609759>

## **Formative Assessment Strategies**

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### Formative Assessment Strategies

- Analysis of kahoot, socrative, and IXL results
- Scavenger hunt self checking assessment
- Quizzes: Unit 3 quiz 1, Unit 3 Quiz 2
- Test: per content area or full unit
- Exit Tickets- 1 to 3 problems related to the day's activities with a survey portion to evaluate the student's own feeling of understanding
- Homework through Google Classroom or documents
- Hands on projects during class time or for homework
- Class participation/Classwork: show of hands, thumbs up or down, whiteboard responses, text through remind, etc.
- Observation throughout unit: communication with classmates/teachers/paraprofessionals

## **Learning Activities/Unit of Study**

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### Learning Activities/Unit of Study

- Do Now problems related to previous learned skills.
- Review/Check Homework - (group check, partner check, whiteboard check)
- Work together to understand and practice the skill - partner work/larger group work to read lesson, and practice skills through “On Your Own” problems incorporated throughout each lesson
- Stations - (Small group instruction, skills practice - scavenger hunts, online games, board work)
- Board/White Board Work - (solve problems/practice skills at board, or at seat with individual white boards)
- Kahoot to reinforce skills
- Review and practice skills using a variety of materials - (communicators, chromebook, games, activities, discussion)
- Thumbs up/down/sideways - quick formative assessment to gauge students level of understanding
- Foldables - create an organized study guide per chapter
- Jeopardy style review games
- Relay races--each student does one part of a problem, hands it to the next student to check then completes the next part, etc.
- Socrative--non-multiple choice technology option where students can either “race” or work at the teacher-pace
- Videos by YouTube to introduce or reinforce concepts in an engaging and comical way
- Online games on chromebooks
- Exploration activities around the room and or school.
- IXL practice problems on their cell phones or chromebooks with and without a partner
- Interactive projects during and after class time.
- Board games: Math- Jenga, Mathopoly, Uno, etc.
- Basketball review games
- Notebook for foldables and notes that are taken throughout the units

## **Modifications and/or Accommodations**

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### **Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)**

#### **English Language Learners**

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

**Front-Loading Vocabulary:** The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

## **Special Education Students**

**Chunking:** The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

**Checking for Understanding:** It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

**Extra time:** The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

**Oral Reading:** The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

**Timers:** The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

## **Students with 504 Plans**

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## **Gifted & Talented Strategies**

**Extensions/Enrichments:** Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply

acquired knowledge, and/or to produce something in reference to acquired knowledge.

**Modify/Change Activities:** Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

## Students at Risk of School Failure

**Directions or Instructions:** Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

**Peer Support:** Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

**Alternate or Modified Assignments:** Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

**Increase One to One Time:** When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

**Contracts:** It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

**Hands On:** As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

**Tests/Assessments:** Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

**Seating:** Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.

