### **Trigonometry In the Real World**

An introduction to trigonometry

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http://nortellearnit.org/rawmedia\_repository/28260698\_2CA7\_4547\_A230\_0C4722F5BB90?do cument.pdf

**DATE LESSON TO BE TAUGHT:** 8<sup>th</sup> and 9<sup>th</sup> days of the 4 week unit.

#### GRADE LEVEL: 10-12

**CONCEPT(S):** The purpose of this lesson is to teach students the basics of trigonometry, namely the functions of sine, cosine, and tangent. This will not only be useful to them in their other courses, but it is a necessary introductory concept to learn to solve the driving question. **OBJECTIVES:** 

SWBAT

- Use the internet to research trigonometry
- Draw a right triangle and label angles and names of sides.
- List the relationships between angles and sides of a right triangle (sin, cos, tan).
- Understand the meaning of SOH CAH TOA and define each abbreviation.
- Calculate simple trig functions to solve for missing angles or sides of a triangle.

**TEKS:** §111.34. Geometry (G.5) **Geometric patterns.** The student uses a variety of representations to describe geometric relationships and solve problems. The student is expected to: (D) identify and apply patterns from right triangles to solve meaningful problems, including special right triangles (45-45-90 and 30-60-90). (G.11) **Similarity and the geometry of shape.** The student applies the concepts of similarity to justify properties of figures and solve problems. The student is expected to: (A) use and extend similarity properties and transformations to explore and justify conjectures about geometric figures; (B) use ratios to solve problems involving similar figures; (C) develop, apply, and justify triangle similarity relationships, such as right triangle ratios

§111.35. Precalculus (P.3) The student uses functions and their properties, tools and technology, to model and solve meaningful problems. The student is expected to: (A) investigate properties of trigonometric and polynomial functions; (B) use functions such as logarithmic, exponential, trigonometric, polynomial, etc. to model real-life data; (D) use properties of functions to analyze and solve problems and make predictions; and (E) solve problems from physical situations using trigonometry.

#### MATERIALS LIST and ADVANCED PREPARATIONS:

Per each group of students

- 1 computer
- 1 graphing calculator for each student
- Sheets of notebook paper for calculations

#### SAFETY:

There is no foreseen safety issues with this lesson, just make sure that all students are on task. This includes making sure that the students DO NOT look up sites on the internet that are inappropriate.

ENGAGEMENT		
What the Teacher Will D	o Eliciting Questions Formative Assessment	Student Responses
Show these pictures:	"Suppose you were asked to estimate the cost of materials needed to build a new bridge over the river running through your town. Of course you would need to know the length of the span (along with many other details). How could you measure the distance across the river while standing on one of the banks?"	-Students shout out ideas on how to measure this.
	<ul> <li>"On a sunny day, what method could you use to determine the height of the flag pole in front of your school (while standing on the ground)?"</li> <li>"While learning about the solar system, have you ever wondered how the distances between the planets were discovered?"</li> </ul>	<ul> <li>-Use a really big measuring tape!</li> <li>-Maybe scientists found distances from their telescopes?</li> </ul>
	"Each of these distances can be determined based on the special mathematical properties of right triangles. Can you think of other distances that are difficult to measure directly?"	-Any distance where you cannot put a measuring tape or ruler up to.
	could use indirect measurement methods in these situations?"	

EXPLORATION		
What the Teacher Will Do	Eliciting Questions	Student Responses
	Formative Assessment	
	What are the special	-Some students might know
	mathematical relationships	that an angle is somehow
	among the sides and angles of	related to how long or short a

right triangles?	side of a triangle is.
What are some of the various ways these relationships can be used?	-To figure out unknown angles or sides.
First, use web resources to find the definitions of these mathematical terms:	-Students break into groups and research these definitions.
Right Triangle Trigonometry Ratio Sine Cosine	
	What are some of the various ways these relationships can be used? First, use web resources to find the definitions of these mathematical terms: Right Triangle Trigonometry Ratio Sine Cosine Tangent

## EXPLANATION

What the Teacher Will Do	Eliciting Questions	Student Responses
	Formative Assessment	
Draw this figure on the board:	Have students write	-Students write definitions on
B	definitions for the terms on the	the board.
	board underneath the figure.	
opposite		
right angle <b>A</b> angle	"A good way to remember	
A adiacent C C	which ratios to use is this	
	acronym: SOH CAH TOA"	

## ELABORATION

What the Teacher Will Do	Eliciting Questions	Student Responses
	<b>Formative Assessment</b>	
Define the parts of "SOH	SOH stands for: $sin =$	-Students write down
CAH TOA" and have students	opposite over hypotenuse	definitions.
write down in their lab	CAH stands for: $\cos =$	
journals the definitions.	adjacent over hypotenuse	
	TOA stands for: $tan =$	
	opposite over adjacent	
	Once you have the sin ,	
	cos, or tan ratio of the	
	sides of the triangle, the next	
	step is to type sin <sup>-1</sup> , cos <sup>-1</sup> , or	
	tan <sup>-1</sup> , respectively, of the ratio	
	into your calculator to get the	
	angle you're looking for.	

## **EVALUATION**

What the Teacher Will Do	Eliciting Questions	Student Responses
	Summative Assessment	
Homework:	-Next time we will be talking	
Have the students research	about your findings for uses	
real life applications of	for trigonometry in the real	
trigonometry and have them	world and your examples of	
solve a real world problem	problem solving using	
from their home (example:	trigonometry.	
what is the angle smallest		
angle that a cup can hold a		
ruler at on a table before the		
ruler falls flat on the table?)		