

27 Lesson Plan: Measuring Triangles

Name _____

Due: Wednesday, 11/11/03

Why?

Measuring the angles and sides of triangles began perhaps with agriculture several millennia ago. Now such measurements are used in navigation and the study of forces in the superstructure of bridges, airplanes, and cars.

Overview

We have studied the trigonometric functions from the unit circle point of view using right triangles. We have learned how to evaluate and graph such functions. In this section, we will learn how to apply the sine and cosine functions to measure the angles and sides of acute and scalene triangles. The ability to measure angles and sides of triangles will be used in the study of vectors in calculus.

Prerequisites

1. You should possess knowledge of the unit circle definition of sine and cosine along with similarity in right triangles.
2. You should know what conditions on the angles and sides of two triangles force these triangles to be congruent (ASA, SAS, SSS)
3. You should possess knowledge of measuring angles in radians and degrees.
4. You should know that the sum of the measures of the angles in a triangle is 180° .
5. You should know the Pythagorean theorem.
6. You should know SOHCAHTOA.

Learning Objectives

1. You will learn to label the sides and angles of a triangle using the Roman and Greek alphabets.
2. You will learn the law of cosines.
3. You will learn the law of sines.
4. You will learn how to solve triangles using the law of sines and the law of cosines.
5. You will learn how to solve triangles in real world situations.

Performance Criteria

1. You will be able to solve triangles by finding all three angles and three sides of a triangle given 2 sides and 1 angle or 2 angles and 1 side.
2. You will be able to investigate real world problems that involve the measurement of the angles and sides of triangles.

Vocabulary

1. Solve a triangle
2. Opposite, adjacent, hypotenuse
3. Law of Sines
4. Law of Cosines
5. Angle opposite

4. State the Law of Sines? Do the capital letters refer to angles or sides?

5. State three versions of the Law of Cosines. Why are these useful when you know either SAS or SSS?

$$a^2 =$$

$$b^2 =$$

$$c^2 =$$

6. In which of the situations (SAS, AAS, ASA, SSS) do you use the Law of Sines? In which, the Law of Cosines?

SAS _____

ASA _____

AAS _____

SSS _____

7. Can you give an example of a situation where you know three items of a triangle, but cannot determine which of two triangles this information determines? Do so with a diagram below (showing both possibilities).



Applications

In Section 7.1: exercises #1-5, 11, 16, 17

Problem Solving

In Section 7.1: problems #22, 23, 26, 29, 33, 35

Self-Assessment

- Can you solve a triangle where you have AAS?
- Can you solve a triangle where you have SSS?
- Do you know under what conditions you have to worry about two triangles existing for the 3 pieces of information given?

Extensions

- Why is it that you only need two pieces of information to solve a right triangle, say two sides or just an angle and a side?
- Is there a Law of Tangents? What might it say? How would you find out?
- Why is there no ambiguous case when the Law of Cosines is used?
- Are there situations when you could use either the Law of Sines or the Law of Cosines? How do you know which one to use?