Area of a Triangle Video Lecture

Section 8.4

Course Learning Objectives:
Demonstrate an understanding of trigonometric functions and their applications.

Weekly Learning Objectives:
1) Find the area of SAS triangles.
2) Find the area of SSS triangles.
Area of a Triangle

You are probably already familiar with the area of a triangle formula:

\[ A = \frac{1}{2}bh \]

Proof:

What if we don't know the base and the height of the triangle, but instead know 2 sides and the included angle. (SAS)

\[ A = \frac{1}{2}bh = \]

This formula is true for both acute and obtuse angles \( \theta \).
Example: Find the area of the triangle illustrated.
Heron's Formula for finding the area $A$ of a $\triangle$ if you are given the lengths of the sides. (SSS)

The area $A$ of $\triangle ABC$ if given by

$$A = \sqrt{s(s - a)(s - b)(s - c)}$$

where $s = \frac{1}{2}(a + b + c)$ is the semiperimeter of the triangle.

Example

You own a triangular lot that has sides of 371 feet, 280 feet, and 160 feet. What is the area?
Proof of Heron's Formula:

\[ c^2 = a^2 + b^2 - 2ab \cos C \]

\[ A = \frac{1}{2} ab \sin C \]

\[ \cos C = \frac{a^2 + b^2 - c^2}{2ab} \]