

# Area of a Triangle Video Lecture

## Section 8.4

### Course Learning Objectives:

Demonstrate an understanding of trigonometric functions and their applications.

### Weekly Learning Objectives:

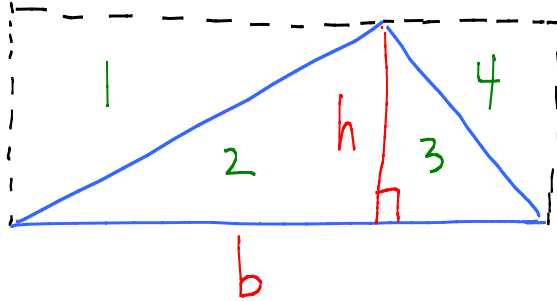
- 1) Find the area of SAS triangles.
- 2) Find the area of SSS triangles.

## Area of a Triangle

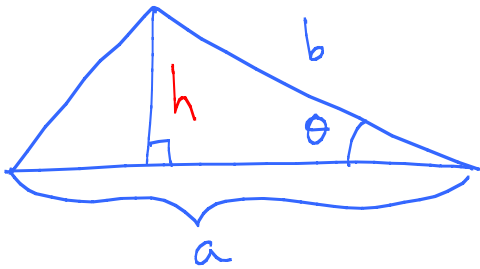
You are probably already familiar with the area of a triangle formula:

$$A = \frac{1}{2}bh$$

Proof:



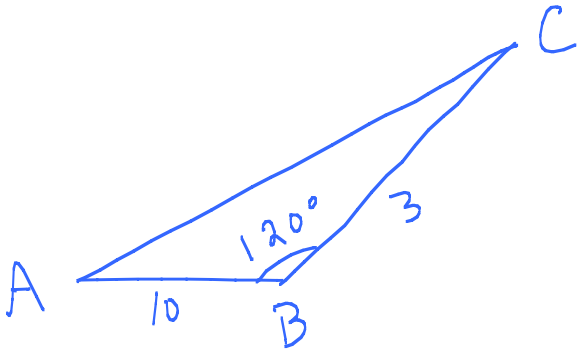
What if we don't know the base and the height of the triangle, but instead know 2 sides and the included angle. (SAS)



$$A = \frac{1}{2}bh =$$

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  $\triangle ABC$  is 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:

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

$$A = \frac{1}{2}ab\sin C$$

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