

Unit 4: Triangle Trigonometry

Oblique (Non-Right) Triangles

Section 6.1 Law of Sines

Solve ASA, SAA, and SSA triangles

Case 1: One side and two angles are known (ASA, SAA)

Case 2: Two sides and the angle opposite one of them are known (SSA)

Case 3: Two sides and the included angle are known (SAS)

Case 4: Three sides are known (SSS)

The Law of Sines is used to solve triangles in which Case 1 or 2 holds.

Law of Sines:
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

If given ASA or AAS there is one unique triangle which can be solved using Law of Sines.

If given two sides and the angle opposite one of them (SSA), it is possible that 0,1,or 2 triangles exist. This is called the **Ambiguous Case** Law of Sines.

- If given angle is acute, can have 0,1,2 triangles
- If given angle is obtuse, can have 0 or 1 triangles.

Given acute angle A:

- if $a > b$ 1
- if $a < b$
 - $a < b \sin A$ 0
 - $a = b \sin A$ 1
 - $a > b \sin A$ 2

Given obtuse angle A:

- $a \leq b$ 0
- $a > b$ 1

Reminders:

- In any triangle the shortest side must be opposite the smallest angle; longest side opposite the biggest angle
- The sum of the two shortest sides must be larger than the 3rd side.
- Supplementary angles have the same sine.