Solving Triangles Using the Law of Sines - Part II

Preliminaries and Objectives

- Law of Sines

Objectives:
- Given three parts of a triangle (SSA), find the missing three parts. There may be two possibilities.

Example 1

\[
\begin{align*}
\sin 49^\circ & = \frac{\sin C}{12} \\
C & \approx 64.91^\circ \text{ OR } 115.09^\circ
\end{align*}
\]

Example 2

\[
\begin{align*}
A & = 49^\circ \quad C = 44.16^\circ \\
B & = 180^\circ - 49^\circ - 135.84^\circ \\
B & = -4.8^\circ
\end{align*}
\]

But we can’t have a negative angle in a triangle!

Example 3

\[
\begin{align*}
A & = 49^\circ \quad C = 135.84^\circ \\
B & = 180^\circ - 49^\circ - 135.84^\circ \\
B & = -4.8^\circ
\end{align*}
\]

SSA

Given two sides and an angle opposite one of the two sides
- Try to find the angle opposite the second side by using the Law of Sines. If you are taking the inverse sine of a number bigger than 1, you will get no solution, otherwise
- Your calculator will give you one possible angle \( \theta \), the second possible angle is \( 180^\circ - \theta \).
- Find the third angle. If the sum of the first two angles is more than \( 180^\circ \), then there will only be one solution.
- Find the third side of all possible triangles using the Law of Sines.