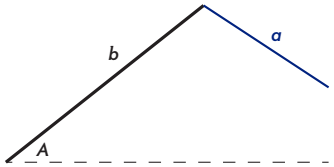
Law of Sines Ambiguous Case

Preliminaries

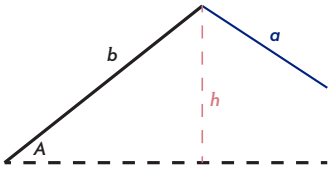
Precondition

SSA - The law of signs is ambiguous only when the problem gives you two sides and a *non*-included angle, as at right.



Quick check for number of triangles

Calculate the length of a perpendicular (h in the diagram at right) from the end of the given adjacent side (b) to the adjacent side not specified (the bottom dashed line).



$h = b \sin(A)$

- $a < h$ — *no triangle*
- $a = h$ — *1 triangle*
- $a > h$ & $a < b$ — *2 triangles* (*i.e.*, ambiguous case)
- $a < h$ & $a > b$ — *1 triangle*

Solve the Triangle

1. *Solve for a second angle* - Use the Law of Sines to solve for one of the other angles; let's call this angle B.
2. *Subtract $m\angle B$ from 180*.
   - This is a *possible* alternative to $\angle B$.
   - Let's call this new angle B_2.
3. *Add $m\angle B_2$ to your original angle* (*i.e.*, $\angle A$ in the diagram above).
4. *Is the sum ≥ 180?*
   - *Yes*: the alternative doesn't work; you may ignore $\angle B_2$ and solve the triangle using only $\angle B$.
   - *No*: $\angle B_2$ is a viable alternative to $\angle B$; you will need to solve the triangle twice: once using $\angle B$ as the second angle and again using $\angle B_2$.