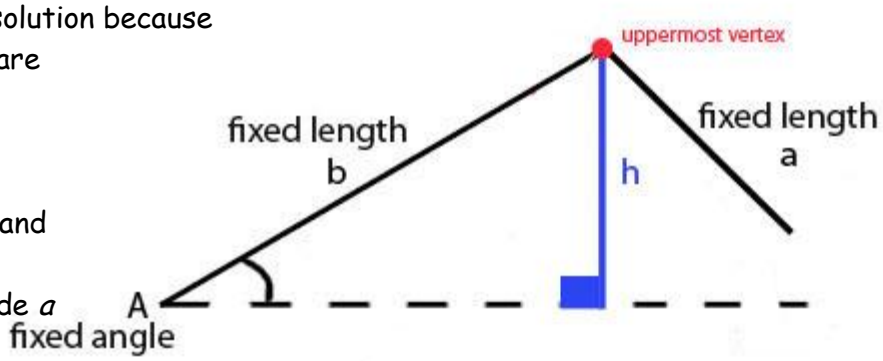
7a.1-SSA… The Ambiguous Case

When we have a Side-Side-Angle situation, the law of Sines is not guaranteed to give us the *only* solution because when we take the inverse sine, there are more than one possible angle.



For an acute angle *A*

Suppose we are given angle A, side *b*, and side *a* like in the drawing to the right. This will only make a triangle if the side *a* is longer than the height *h*. As we have seen before, the height can be found using $h = b \sin A$. So, we get three cases:

Relationship of a and $h = b \sin A$	Number of Triangles
$b \sin A > a$	0 possible triangles
$b \sin A < a \quad and \quad b < a$	1 possible triangle
$b \sin A < a \quad and \quad b > a$	2 possible triangles
$b \sin A = a$	1 possible triangle… it's a right triangle!

For an obtuse angle A

When we have an obtuse angle A, we simply need the opposite side a to be greater than b.

$a < b$	0 possible triangles
$a > b$	1 possible triangle

Extra Practice

1. Decide if there are one, two, or no possible triangles with the given measurements. Explain and show any work.
   a. $a = 9, b = 7, A = 108°$

   b. $a = 14, b = 15, A = 117°$

   c. $a = 5, b = 12, A = 27°$

d. $a = 35, b = 24, A = 82°$

e. $a = 19, b = 38, A = 30°$

f. $a = 6, b = 6, A = 63°$

g. $a = 10, b = \sqrt{200}, A = 45°$

2. Find two triangles with the given angle measure and side lengths. Round side lengths to the nearest tenth and angle measures to the nearest degree.

$$A = 39°, a = 12, b = 17$$