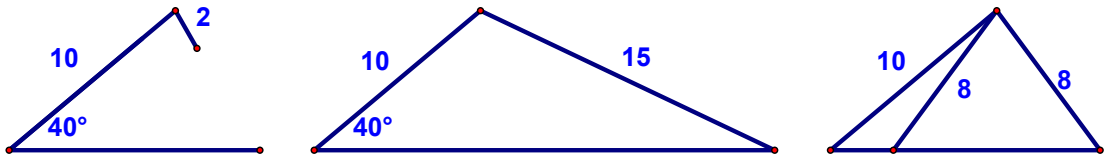
Section 6.1 – Law of SINES – Ambiguous Case

The SSA case (the ambiguous case)

Why is this ambiguous?
In Geometry, you learned that you could prove that two triangles were congruent using the following methods:

SSS
ASA
SAS
AAS

However, when you were given two sides and the NON-included angle (SSA) then, depending on the information given, you could construct 0, 1, or 2 triangles!
Here is what they might look like:



0 Triangles **1 Triangle** **2 Triangles**

So this means that **not just one** unique triangle can necessarily be created.

Now, how do we figure out if there are 0, 1, or 2 triangles with a SSA problem? Start by drawing a triangle with $m\angle A = 30°$ and $b = 10$.

What do we know about side "a"?

$If\ a < 5 \rightarrow$

Now: $If\ a > 10 \rightarrow$

$If\ 5 < a < 10 \rightarrow$

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Ex. 1) In ΔABC, m<A = 30°, a = 7, and b = 12. Solve the triangle for all the missing sides and angles.

Ex. 2) In ΔABC, m<A = 30°, a = 4, and b = 12. Solve the triangle for all the missing sides and angles.

Ex.3) In ΔABC, m<A = 20°, a = 12, and b = 10. Solve the triangle for all the missing sides and angles.

Ex.4) In ΔABC, m<A = 30°, a = 6, and b = 12. Solve the triangle for all the missing sides and angles.

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Ex.5) In ΔABC, m<A = 40°, a = 75, and b = 85. Solve the triangle for all the missing sides and angles.

Ex.6) In ΔABC, m<A = 85°, a = 15, and b = 25.
Solve the triangle for all the missing sides and angles:

Law of Sines: Applications!

1) A telephone pole tilts AWAY from the sun at a 7° angle from the vertical, and it casts a 27-foot shadow. The angle of elevation from the tip of the shadow to the top of the pole is 52°. How tall is the pole?

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2) Observers 2.32 miles apart see a hot-air balloon directly between them but at the angles of elevation shown in the figure. Find the altitude of the balloon: