DESCRIBE CASES
Because the SSA case can result in 0, 1, or 2 triangles, it is called the *ambiguous case*.

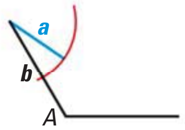
SSA CASE Two angles and one side (AAS or ASA) determine exactly one triangle. Two sides and an angle opposite one of the sides (SSA) may determine no triangle, one triangle, or two triangles.

KEY CONCEPT *For Your Notebook*

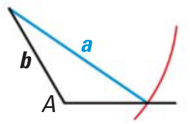
Possible Triangles in the SSA Case

Consider a triangle in which you are given a, b, and A. By fixing side b and angle A, you can sketch the possible positions of side a to figure out how many triangles can be formed. In the diagrams below, note that $h = b \sin A$.

***A* is obtuse.**

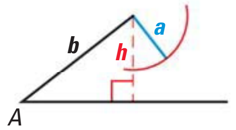


$a \le b$
No triangle

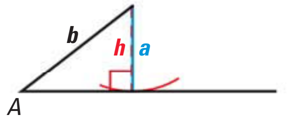


$a > b$
One triangle

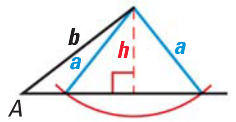
***A* is acute.**



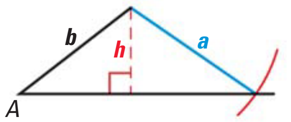
$h > a$
No triangle



$h = a$
One triangle



$h < a < b$
Two triangles



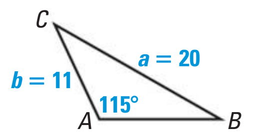
$a > b$
One triangle

EXAMPLE 2 Solve the SSA case with one solution

Solve $\triangle ABC$ with $A = 115°$, $a = 20$, and $b = 11$.

Solution

First make a sketch. Because A is obtuse and the side opposite A is longer than the given adjacent side, you know that only one triangle can be formed. Use the law of sines to find B.



$$\frac{\sin B}{11} = \frac{\sin 115°}{20}$$ **Law of sines**

$$\sin B = \frac{11 \sin 115°}{20} \approx 0.4985$$ **Multiply each side by 11.**

$$B \approx 29.9°$$ **Use inverse sine function.**

You then know that $C \approx 180° - 115° - 29.9° = 35.1°$. Use the law of sines again to find the remaining side length c of the triangle.

$$\frac{c}{\sin 35.1°} = \frac{20}{\sin 115°}$$ **Law of sines**

$$c = \frac{20 \sin 35.1°}{\sin 115°}$$ **Multiply each side by sin 35.1°.**

$$c \approx 12.7$$ **Use a calculator.**

▶ In $\triangle ABC$, $B \approx 29.9°$, $C \approx 35.1°$, and $c \approx 12.7$.