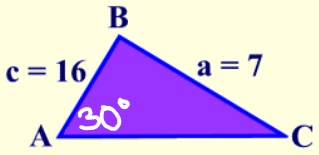
Law of Sines-Ambiguous Case

Can be used if you know: AAS or ASA

If you know SSA, this is called the *ambiguous case.*

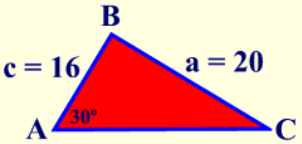
Always check by doing the following:



$\frac{\sin A}{a} = \frac{\sin C}{c} \rightarrow \frac{\sin 30}{7} = \frac{\sin C}{16}$

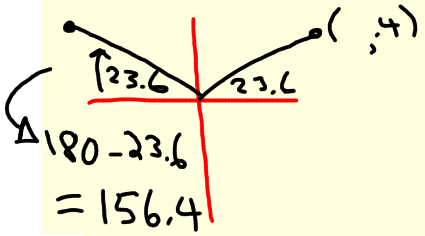
$\sin C = 1.14$

No triangle



$\frac{\sin A}{a} = \frac{\sin C}{c} \rightarrow \frac{\sin 30}{20} = \frac{\sin C}{16}$

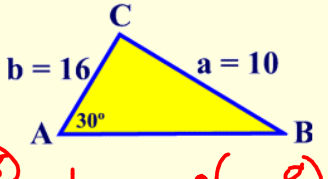
$\angle C = 23.6$



$\angle A = 30, \angle B = 126.4 \quad \angle C = 23.6$

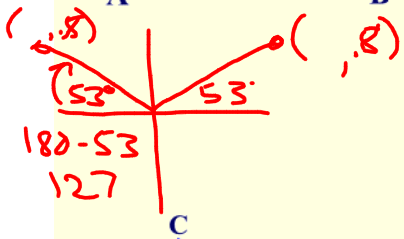
$\angle A = 30 \qquad \angle C = 156.4$

No 2nd triangle

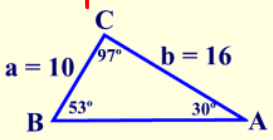


$\frac{\sin A}{a} = \frac{\sin B}{b} \rightarrow \frac{\sin 30}{10} = \frac{\sin B}{16}$

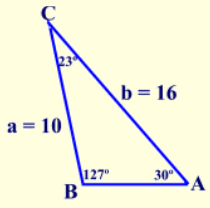
$\angle A = 30 \quad B = 53 \quad \angle C = 97$



$\angle A = 30 \quad \angle B = 127 \quad \angle C = 23$



TWO triangles possible.

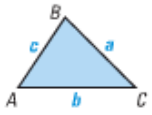


Area of a Triangle & Sine Practice

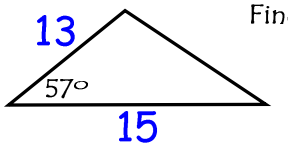
KEY CONCEPT *For Your Notebook*

Area of a Triangle

The area of any triangle is given by one half the product of the lengths of two sides times the sine of their included angle. For $\triangle ABC$ shown, there are three ways to calculate the area:



$\text{Area} = \frac{1}{2}bc\sin A$ $\quad \text{Area} = \frac{1}{2}ac\sin B$ $\quad \text{Area} = \frac{1}{2}ab\sin C$



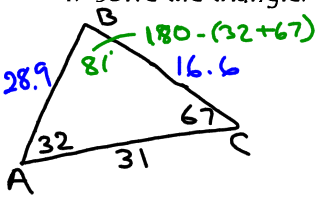
Find the area of this triangle.

$\text{Area} = \frac{1}{2}(13)(15)(\sin 57)$

$= 81.8 \text{ un}^2$

Law of Sines Practice:

1. Solve the triangle: A = 32 °, C = 67° and b = 31



ASA

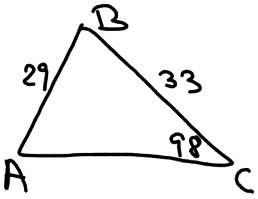
$\frac{\sin B}{b} = \frac{\sin A}{a} \rightarrow \frac{\sin 81}{31} = \frac{\sin 32}{a}$

$a = 16.6$

$\frac{\sin B}{b} = \frac{\sin C}{c} \rightarrow \frac{\sin 81}{31} = \frac{\sin 67}{c}$

$c = 28.9$

2. Solve the triangle: a = 33, C = 98 ° and c = 29

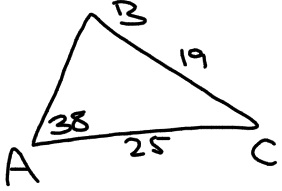


$\frac{\sin C}{c} = \frac{\sin A}{a} \rightarrow \frac{\sin 98}{29} = \frac{\sin A}{33}$

$\sin A = 1.13$

no triangle

3. Solve the triangle: A = 38 °, a = 19, and b = 25



$\frac{\sin A}{a} = \frac{\sin B}{b} \rightarrow \frac{\sin 38}{19} = \frac{\sin B}{25}$

$\angle A = 38 \quad B = 54° \quad \angle C = 88°$

2nd solution? $\angle A = 38 \quad \angle B = 126 \quad \angle C = 16$