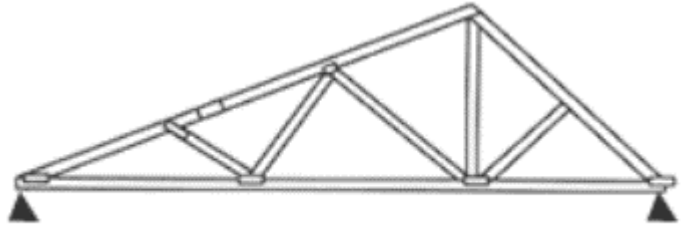


## The Sine Law

When a triangle does not have a right angle, it is possible to draw an altitude that creates two right angled triangles.

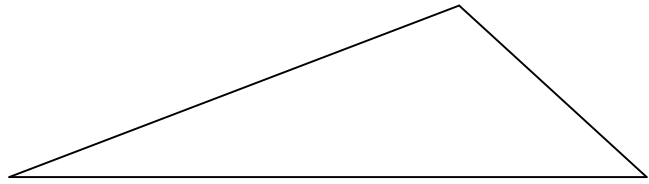
Example – A cottage is being designed with an asymmetrical roof (shown below) in order to install solar panels on one face. The rafters on one side will be 18 ft long and sloped at  $39^\circ$ . The shorter rafters will be sloped at  $56^\circ$ .

- a) Determine the height of the roof.
- b) Determine the length of the shorter rafters.



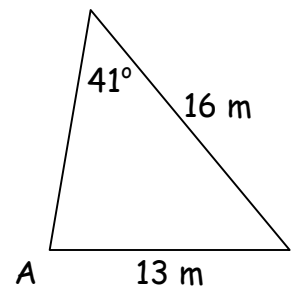
The sine law is a formula for calculating an opposite angle or length in any triangle.

We can draw an altitude (as we did in the previous question) to prove the sine law.



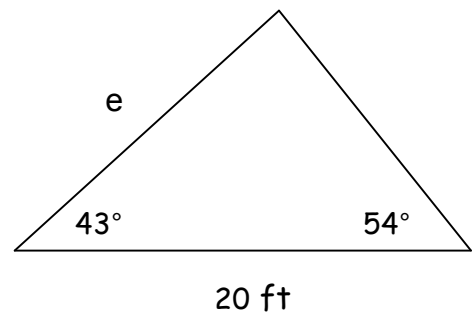
We can only apply the Sine Law if we know an angle and the opposite side length.

Example – Solve for the indicated angle in the following acute triangle.



We may need to determine the third angle before we can apply the Sine Law.

Example – Solve for the indicated side length in the following acute triangle.



Homework – Please solve the following problems and complete:

questions # 32 and 33 on page 376

question #22 on page 384

questions # 2 and 3 on page 402

1. A house is being designed with an asymmetrical roof in order to install solar panels on one face. The rafters on one side will be 24 ft long and sloped at  $38^\circ$ . Determine the length of the rafters on the other side, sloped at  $55^\circ$ .
2. While site-seeing at Multnomah Falls in Oregon State, two math students stood at opposite ends of the 45 ft long footbridge and measured angles of depression of  $66^\circ$  and  $51^\circ$  to a rock in the river below them. Determine the height of the bridge above the river.