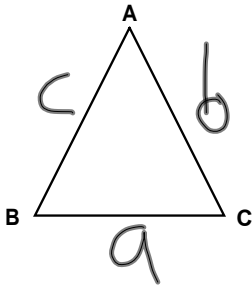


## Chapter 8: Trigonometry of Acute Triangles

### 8.1 - The Sine Law (Day 2)



The relationship between the sides and their opposite angles in any  $\triangle ABC$  is:

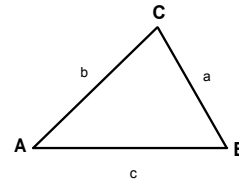
### Sine Law

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

**Sine Law:** The ratio of each side to its opposite angle is equal!

### Sine Law

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$



**Note:** Even though there are three parts to this equation, you only use two parts at a time. The choice of which two to use depends on what information is given.

**The Sine Law can be used in any triangle to find:**

1. An unknown side when two angles and a side are known
2. An unknown angle if two sides and the angle opposite one of the known sides are known

1 Find the length of side 'b'

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$



$$\frac{24}{\sin 108} = \frac{b}{\sin 33} = \frac{c}{\sin C}$$

$$\frac{24}{\sin 108} = \frac{b}{\sin 33}$$

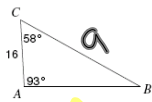
$$24(\sin 33) = b(\sin 108)$$

$$\frac{24(\sin 33)}{\sin 108} = b$$

$$b = 13.7$$

2 Find the length of side 'a'

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



$\angle B = 180 - 58 - 93 = 29^\circ$

$\frac{a}{\sin 93} = \frac{16}{\sin 29} = \frac{c}{\sin 58}$

$\frac{a}{\sin 93} = \frac{16}{\sin 29}$

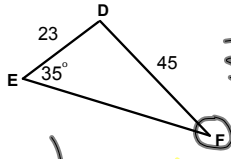
$a(\sin 29) = 16(\sin 93)$

$a = \frac{16(\sin 93)}{\sin 29}$

$a = 33.0$

3 Find Angle F

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



$\frac{d}{\sin D} = \frac{e}{\sin E} = \frac{f}{\sin F}$

$\frac{d}{\sin D} = \frac{45}{\sin 35} = \frac{23}{\sin F}$

$\frac{45}{\sin 35} = \frac{23}{\sin F}$

$45(\sin F) = 23(\sin 35)$

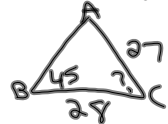
$\sin F = \frac{23(\sin 35)}{45}$

$\sin F = 0.29 \dots$

$\angle F = \sin^{-1}(ans)$

$\angle F = 17.0^\circ$

4 For triangle ABC:  $\angle B = 45^\circ$ ,  $a = 28$ ,  $b = 27$   
Sketch the triangle and then find angle C



$\frac{28}{\sin A} = \frac{27}{\sin 45} = \frac{c}{\sin C}$

$\frac{28}{\sin A} = \frac{27}{\sin 45}$

$28(\sin 45) = 27(\sin A)$

$\frac{28(\sin 45)}{27} = \sin A$

$\angle A = 47.2^\circ$

$\angle C = 180 - 45 - 47.2$

$\angle C = 87.8^\circ$

Complete:

8.1 Sine Law Homework

and

8.1 Sine Law Homework #2