

8.3 Sine Law pt 1

Wednesday, June 3, 2020 3:59 PM

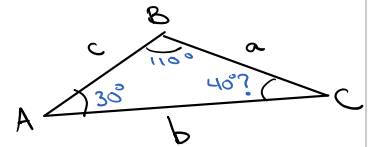
8.3 Sine Law (Part 1)

We know that we can use SOHCAHTOA only when we have a right triangle.

The **SINE LAW** is a relationship between the sides and the angles in ANY

triangle. Let $\triangle ABC$ be any triangle, where a , b and c represent the measures of the sides opposite $\angle A$, $\angle B$ and $\angle C$ respectively.

cross-multiply



Then, the ratios used in the **SINE LAW** are :

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

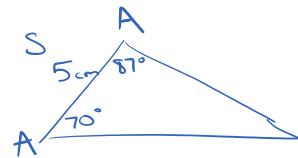
or

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

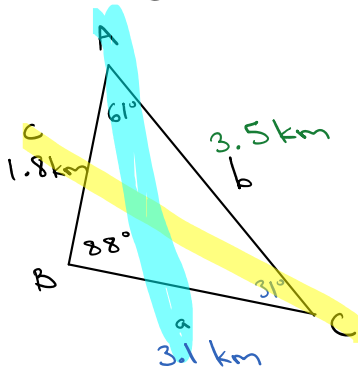
We can also use the fact that $\angle A + \angle B + \angle C = 180^\circ$

The most simple cases of the Sine Law are ASA triangles.

angle-side-angle



Example 1: In triangle ABC , $\angle A = 61^\circ$, $\angle B = 88^\circ$ and side $c = 1.8 \text{ km}$. Find sides a and b .



$$\begin{aligned} \angle C &= 180 - 61 - 88 \\ \angle C &= 31^\circ \end{aligned}$$

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

$$\frac{\sin 31^\circ}{1.8} = \frac{\sin 61^\circ}{a}$$

$$a = \frac{(\sin 61^\circ)(1.8)}{\sin 31^\circ}$$

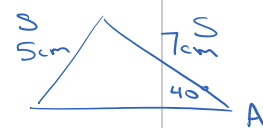
$$a = 3.1 \text{ km}$$

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

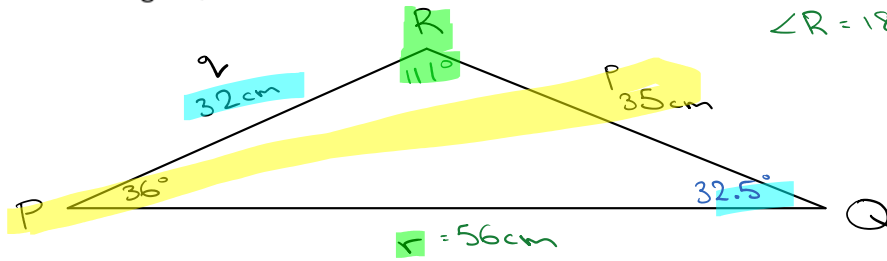
$$\frac{\sin 31^\circ}{1.8} = \frac{\sin 88^\circ}{b}$$

$$b = \frac{(1.8)(\sin 88^\circ)}{\sin 31^\circ}$$

$$b = 3.5 \text{ km}$$



Example 2: In triangle PQR, $\angle P = 36^\circ$, $p = 35$ cm and $q = 32$ cm. Determine the measure of $\angle R$ to the nearest degree, and side r .



$$\angle R = 180 - 36 - 32.5 \dots = 111.5^\circ \approx 111^\circ$$

$$\frac{\sin P}{p} = \frac{\sin R}{r}$$

$$\frac{\sin 36^\circ}{35} = \frac{\sin 111^\circ}{r}$$

$$r = 56 \text{ cm}$$

$$\frac{\sin P}{p} = \frac{\sin Q}{q}$$

$$\frac{\sin 36^\circ}{35} = \frac{\sin Q}{32}$$

$$\sin Q = \frac{(32)(\sin 36^\circ)}{35}$$

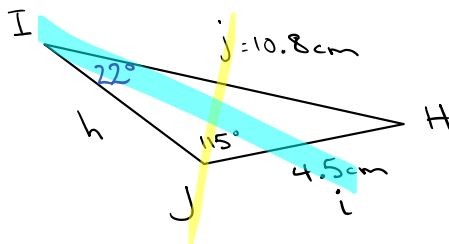
$$\sin Q = 0.5374 \dots$$

$$Q = \sin^{-1}(0.5374 \dots)$$

$$\angle Q = 32.5^\circ$$

ANS

Example 3: In triangle HIJ, $\angle J = 115^\circ$, $i = 4.5$ cm and $j = 10.8$ cm. Find $\angle I$ to the nearest degree.



$$\frac{\sin J}{j} = \frac{\sin I}{i}$$

$$\frac{\sin 115^\circ}{10.8} = \frac{\sin I}{4.5}$$

$$\sin I = 0.3776 \dots$$

$$I = \sin^{-1}(\text{Ans})$$

$$\angle I = 22^\circ$$

Practice: p. 108 # 1-5

Pre-Calc 11