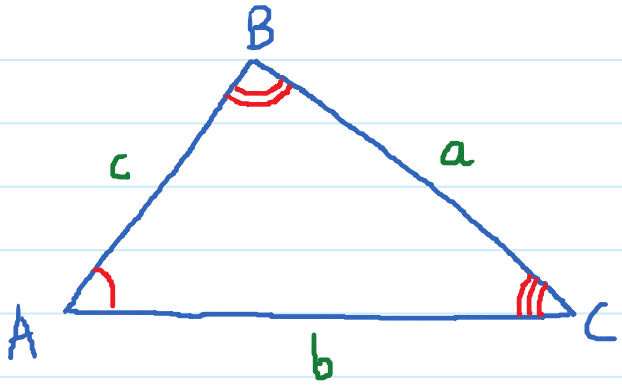
7.1. Law of Sines

Wednesday, April 24, 2019 10:31 AM



Law of Sines:

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

Variation:

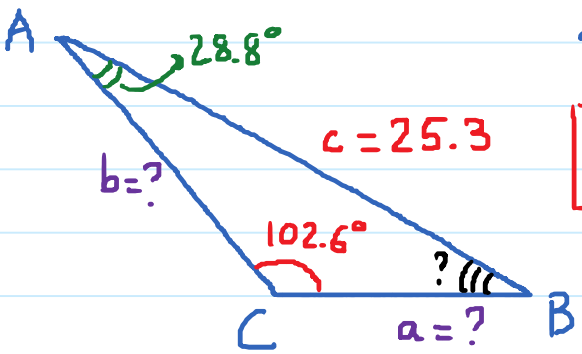
$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

E.g. Solve a triangle given 1 side and 2 angles (SAA)

Solve the triangle ABC if $\angle A = 28.8°$;

$\angle C = 102.6°$; and $c = 25.3$

Sol:



$\angle B = 180° - (28.8° + 102.6°)$

$\angle B = 48.6°$

$$\frac{a}{\sin(A)} = \frac{c}{\sin(C)} \rightarrow a = \frac{c}{\sin(C)} \cdot \sin(A)$$

25.3 ; 28.8° ; 102.6

$$\rightarrow a = \frac{25.3}{\sin(102.6^\circ)} \cdot \sin(28.8^\circ) \simeq \boxed{12.49}$$

$$\frac{b}{\sin(B)} = \frac{c}{\sin(C)} \rightarrow b = \frac{c}{\sin(C)} \cdot \sin(B)$$

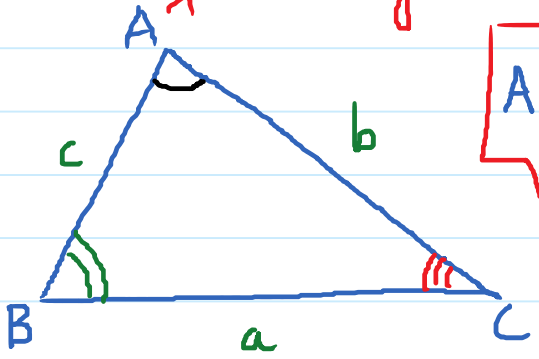
$$\rightarrow b = \frac{25.3}{\sin(102.6^\circ)} \cdot \sin(48.6^\circ) \simeq \boxed{19.45}$$

E.g. Solve triangle ABC given $\angle B = 38^\circ 40'$

$a = 19.7$; $\angle C = 91^\circ 40'$. (ASA).

(Solved on the board!)

Area of a triangle.



$$\text{Area} = \frac{1}{2} bc \sin(A)$$

$$= \frac{1}{2} ac \sin(B)$$

$$= \frac{1}{2} ab \sin(C)$$

E.g. $C = 130.5°$; $a = 46.1$; $b = 35.8$

Area of $\triangle = \frac{1}{2} ab \sin(C)$

$= \frac{1}{2}(46.1)(35.8) \sin(130.5°)$

$\approx \boxed{627.5}$