

Section 6.6: Law of Sines

Law of Sines: $\frac{\sin \alpha}{a} = \frac{\sin \beta}{b} = \frac{\sin \gamma}{c}$

ASA, AAS

ambiguous - SSA

Law of Cosine

SSS

SAS

$$a^2 = b^2 + c^2 - 2bc \cos \alpha$$

$$b^2 = a^2 + c^2 - 2ac \cos \beta$$

$$c^2 = b^2 + a^2 - 2ba \cos \gamma$$

$$c^2 = a^2 + b^2 - 2ab \cos \gamma$$

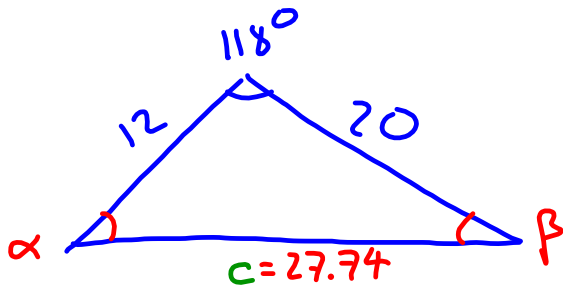
right Triangle

$$\gamma = 90^\circ$$

$$c^2 = a^2 + b^2 - 2ab \cos 90^\circ$$

$$c^2 = a^2 + b^2 - 2ab(0)$$

$$c^2 = a^2 + b^2$$



$$\frac{\sin 118^\circ}{27.74} = \frac{\sin \alpha}{20}$$

$$c^2 = 12^2 + 20^2 - 2 \cdot 12 \cdot 20 \cdot \cos 118^\circ$$

$$c^2 = 769.35$$

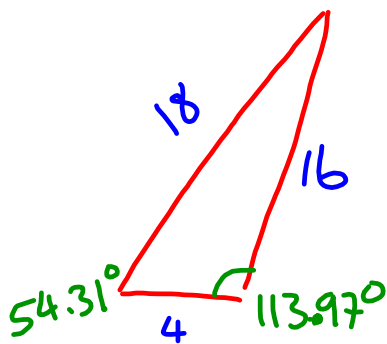
$$\frac{20 \sin 118^\circ}{27.74} = \frac{27.74 \sin \alpha}{27.74}$$

$$c = 27.74$$

$$\beta = 180^\circ - 39.54^\circ - 118^\circ$$

$$\beta = 22.46^\circ$$

$$\sin^{-1}\left(\frac{20 \sin 118^\circ}{27.74}\right) = \alpha = 39.54^\circ$$



$$18^2 = 16^2 + 4^2 - 2 \cdot 16 \cdot 4 \cdot \cos \delta$$

$$324 = 256 + 16 - 128 \cos \delta$$

$$\frac{324 - 272}{-128} = \cos \delta$$

$$\cos^{-1}\left(\frac{324 - 272}{-128}\right) = \delta = 113.97^\circ$$

$$16^2 = 18^2 + 4^2 - 2 \cdot 18 \cdot 4 \cdot \cos \alpha$$

$$\cos^{-1}\left(\frac{256 - 340}{-144}\right) = \alpha = 54.31^\circ$$

$$\beta = 180^\circ - 113.97^\circ - 54.31^\circ = 11.72^\circ$$