

Laws of Sin and Cosine

Laws of Sins: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Laws of Cosines: $a^2 = b^2 + c^2 - 2bc \cos A$

OR $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

aBC	ASA	Sin
BCb	ASA AAS	Sin
aCA	SSA	Sin
abc	SSS	Cos
bCA	SAS	Cos

ASA

1. Find all the missing sides and Angles



$A = 32^\circ$

$B = 81.8^\circ$

$C = 66.2^\circ$

$a = 42.9 \text{ cm}$

$b = 80.1 \text{ cm}$

$c = 74.1 \text{ cm}$

$32 + 66.2 = 98.2^\circ$

$180 - 98.2 = 81.8^\circ$

~~$\frac{\sin(81.8)}{80.1} = \frac{\sin(32)}{a}$~~

$\frac{80.1 \cdot \sin(32)}{\sin(81.8)} = \frac{a \cdot \sin(81.8)}{\sin(81.8)}$

$a = 42.9 \text{ cm}$

~~$\frac{\sin(32)}{42.9} = \frac{\sin(66.2)}{c}$~~

$c = \frac{\sin(32)}{\sin(66.2)} \cdot 42.9 = \frac{42.9 \cdot \sin(32)}{\sin(66.2)}$

$c = 74.1 \text{ cm}$

2. Find side b AAS

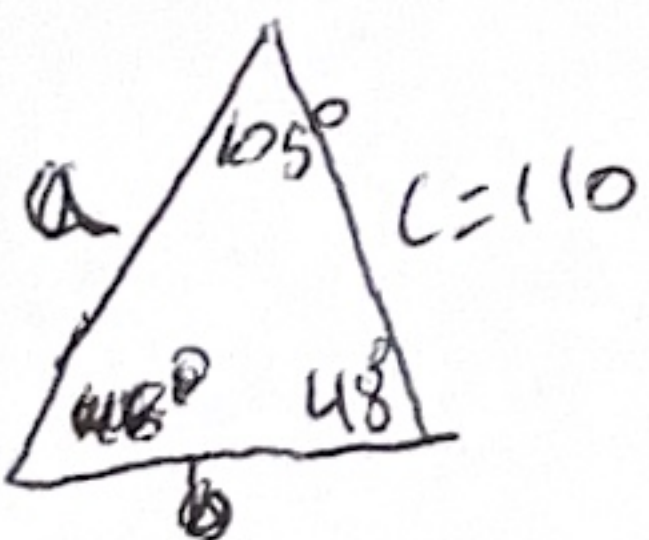
$A = 48^\circ$

$B = 105^\circ$

$C = 27^\circ$

$b = 234$

$c = 110$



$48 + 105 = 153$

$180 - 153 = 27^\circ$

~~$\frac{\sin(27)}{110} = \frac{\sin(105)}{b}$~~

$\frac{b \sin(27)}{\sin(27)} = \frac{110 \cdot \sin(105)}{\sin(27)}$

$b = 234$

3. Find side all missing sides and angles

$$A = 29.68^\circ$$

$$a = 423\text{cm}$$

$$B = 17.693^\circ$$

$$b = 259\text{cm}$$

$$C = 132.6667^\circ$$

$$c = 628.1\text{cm}$$

SSA $\rightarrow$ COS

$$c^2 = 423^2 + 259^2 - 2(423)(259)\cos(132.67)$$

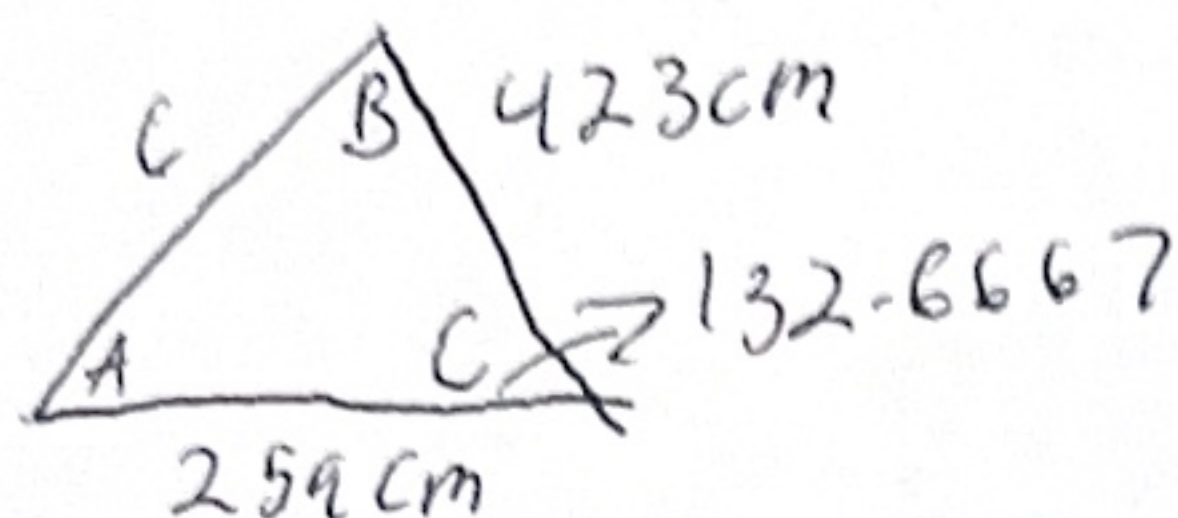
$$178929 + 67081 - 2(423)(259)\cos(132.67)$$

$$= \sqrt{394511.5066} = 628.1\text{cm}$$

$$\cos A = \frac{(259)^2 + (628.1)^2 - (423)^2}{2(259)(628)}$$

$$\cos A = 0.86877$$

$$\hookrightarrow \cos^{-1}(\text{ANS}) = 29.68^\circ$$



$$132.6667 + 29.68 = 162.347$$

$$180 - 162.347 = 17.653^\circ$$

SSS

COS

4. Find angle A

$$A = 80.94^\circ$$

$$a = 20\text{in}$$

$$b = 12\text{in}$$

$$c = 18\text{in}$$

$$\cos A = \frac{12^2 + 18^2 - 20^2}{2(12)(18)}$$

$$\cos A = 0.197407$$

$$\hookrightarrow \cos^{-1}(\text{ANS}) = 80.94^\circ$$

