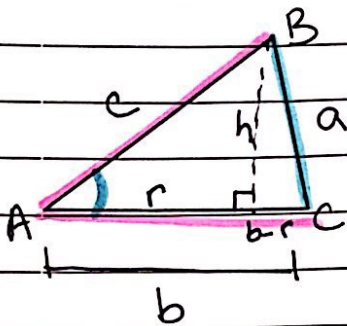


Law of Cosines



$$\sin A = \frac{h}{c}$$

$$\cos A = \frac{r}{c}$$

$$h = c \sin A$$

$$r = c \cos A$$

$$a^2 = h^2 + (b-r)^2$$

$$a^2 = (c \sin A)^2 + (b - c \cos A)^2$$

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

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

$$a^2 = c^2 (\sin^2 A + \cos^2 A) + b^2 - 2bc \cos A$$

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

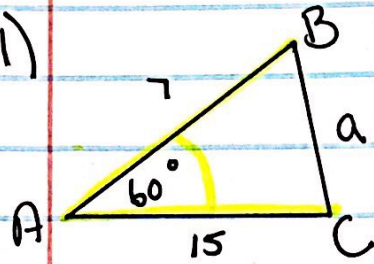
$$c^2 = a^2 + b^2 - 2ab \cos C$$

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

* C.A.S. - Sine, Smaller & 7ml

Side - Angle - Side

1)



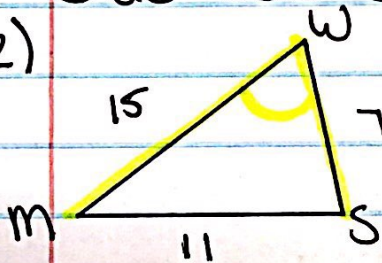
$$b=15 \quad c=7 \quad m\angle A=60^\circ \quad a=?$$

$$a^2 = 7^2 + 15^2 - 2(7)(15)\cos 60^\circ$$

$$a = 13$$

Side - Side - Side

2)



$$m=7 \quad w=11 \quad s=15 \quad m\angle W=?$$

$$11^2 = 7^2 + 15^2 - 2(7)(15)\cos w$$

$$121 = 274 - 210\cos w$$

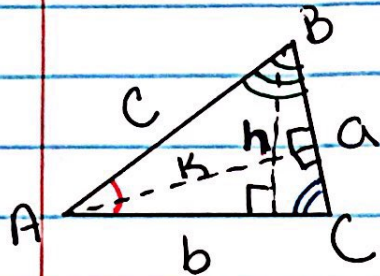
$$-153 = -210\cos w$$

$$\frac{153}{210} = \cos w$$

$$\cos^{-1}\left(\frac{153}{210}\right) = w$$

$$w = 43.2^\circ$$

Law of Sines



$$\sin A = \frac{h}{c}$$

$$\sin C = \frac{h}{a}$$

$$h = c \sin A$$

$$h = a \sin C$$

$$c \sin A = a \sin C$$

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

$$\sin B = \frac{h}{c}$$

$$\sin C = \frac{h}{b}$$

$$h = c \sin B$$

$$h = b \sin C$$

$$c \sin B = b \sin C$$

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

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

Law of Sines

$$\frac{\sin(\Delta)}{\text{opposite side}}$$

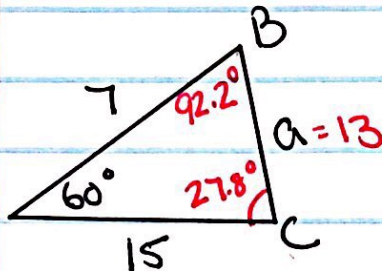
When looking for Δ 's only use
law of sines for acute Δ 's

Solving Δ 's

Given SAS + SSS

Start with the law of cosines

1)



$b=15$ $c=7$ $m\angle A=60^\circ$
 $a=13$
 $a^2 = 7^2 + 15^2 - 2(7)(15)\cos 60^\circ$
 $a=13$

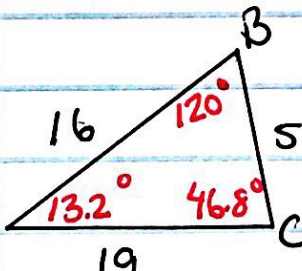
$$\frac{\sin 60^\circ}{13} = \frac{\sin C}{7}$$

SAS - LOC 3rd side
- LOS smallest Δ

$$\sin C = \frac{7 \sin 60^\circ}{13}$$

$$C = 27.8^\circ$$

2)



$a=5$ $b=19$ $c=16$

SSS - LOC largest Δ

$$19^2 = 5^2 + 16^2 - 2(5)(16)\cos B$$
$$361 = 281 - 160\cos B$$

$$80 = -160\cos B$$

$$\cos B = \frac{80}{-160}$$

$$B = 120^\circ$$

$$\frac{\sin 120^\circ}{19} = \frac{\sin C}{16}$$

$$\frac{16 \sin 120^\circ}{19} = \sin C$$

$$C = 46.8^\circ$$