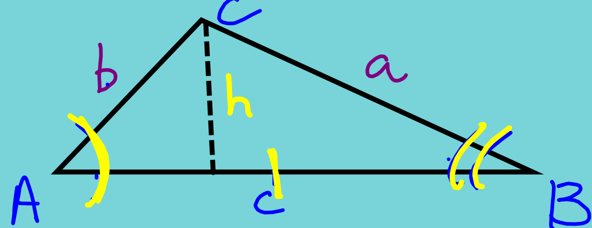
SOLVING OBLIQUE Δ'S & VECTORS

not a right Δ

Law of Sines



ASA
AAS
SSA

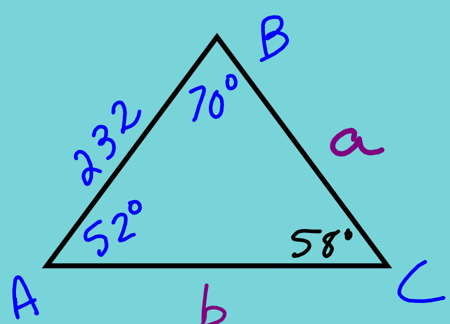
$$\sin A = \frac{h}{b} \qquad \sin B = \frac{h}{a}$$

$$b \sin A = h \qquad a \sin B = h$$

$$\frac{\cancel{b} \sin A}{\cancel{b} a} = \frac{\cancel{a} \sin B}{\cancel{a} b}$$

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

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



Find all missing parts.

$$\angle C = 180° - 122° = 58°$$

$$\frac{a}{\cancel{\sin 52°}} = \frac{232 \cdot \sin 52°}{\sin 58°}$$

$$a = 216$$

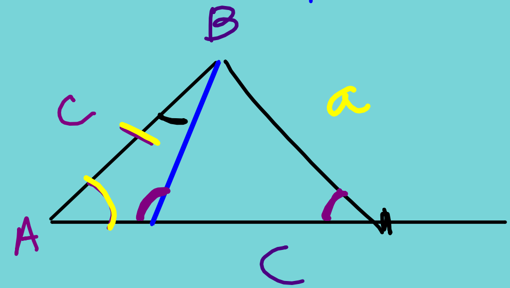
$$\frac{b}{\cancel{\sin 70°}} = \frac{232 \cdot \sin 70°}{\sin 58°}$$

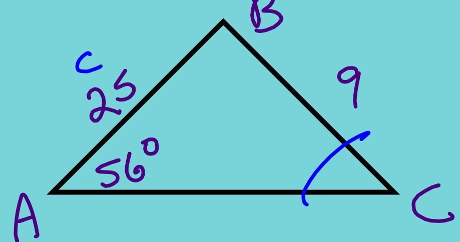
$$b =$$

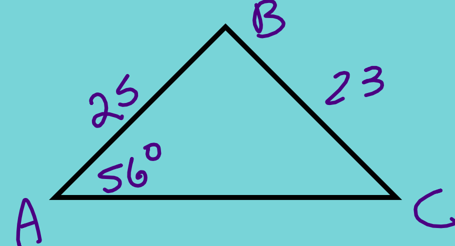
Ambiguous Case of Law of Sines (SSA)

Ambiguous ← unclear, more than 1 possibility

SSA → No Δ | 1 Δ | 2 Δ







Find B.

$$\frac{\sin C}{\cancel{25}} = \frac{\sin 56^\circ}{9} \cdot 25$$

$\sin C = 2.3$ ← not possible

$\sin^{-1}(2.3)$

$\boxed{\text{No } \Delta}$

Find B.

$$\frac{\sin C}{\cancel{25}} = \frac{\sin 56^\circ}{23} \cdot 25$$

$\sin C = 0.9011$

$\sin^{-1}(0.9011) = 64.3^\circ$

64.3 | 64.3

Δ #1	Δ #2
$C = 64.3^\circ$	$C' = 180 - 64.3^\circ = 115.7^\circ$
(given) $A = 56^\circ$	$A = 56^\circ$
$B = 59.7^\circ$	$B' = 8.3^\circ$

$$\begin{array}{r} 180^\circ \\ -120.3 \\ \hline 59.7^\circ \end{array}$$

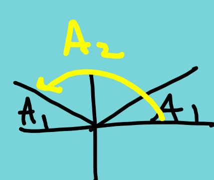
$115.7 + 56^\circ = 171.7^\circ$

$\boxed{B = 59.7^\circ \text{ or } 8.3^\circ}$

March 30, 2022

To Check for 2nd Δ when SSA

1) Solve Law of Sines to get first angle (A_1)
2) $A_2 = 180^\circ - A_1$



3) A_2 + Given angle $< 180^\circ$, then 2 Δ's

   A_2 + Given angle $\geq 180^\circ$, then no 2nd Δ

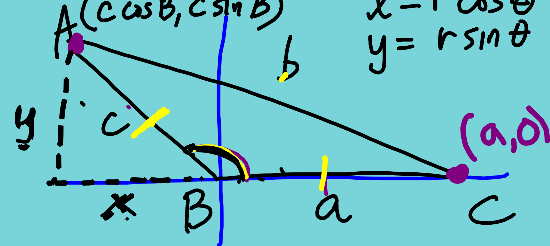
Law of Cosines

SAS, SSS

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

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

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

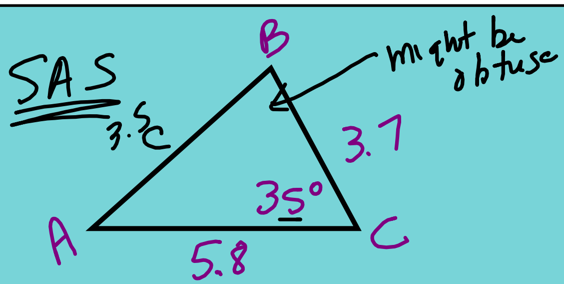


$x = r\cos\theta$
$y = r\sin\theta$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$x = r\cos\theta$
$y = r\sin\theta$

SAS

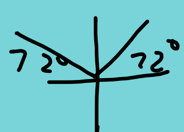


Find B.

$c^2 = 3.7^2 + 5.8^2 - 2(3.7)(5.8)\cos 35°$

$\sqrt{c^2} = \sqrt{12.17}$

$c = 3.5$



~~$\frac{\sin B}{5.8} = \frac{\sin 35°}{3.5} \cdot 5.8$~~

~~$\sin B = 0.95$~~

~~$\sin^{-1}(0.95\ldots\ldots)$~~

~~$B = 72°$~~

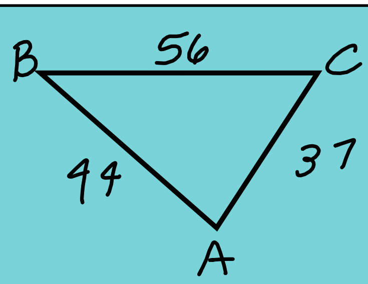
After Law of cos, must find the smallest remaining angle next.

smallest angle

$\frac{\sin A}{\cancel{3.7}} = \frac{\sin 35°}{3.5} \cdot 3.7$

$A = 37°$ $c = 35°$

$B = 180° - 72° = 108°$



Find C.

SSS = Law of Cosines

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

$$44^2 = 37^2 + 56^2 - 2(37)(56)\cos C$$

$$44^2 - 37^2 - 56^2 = -2(37)(56)\cos C$$

$$\frac{44^2 - 37^2 - 56^2}{-2(37)(56)} = \cos C$$

$$0.6199 = \cos C$$

$$51.7^\circ = C$$