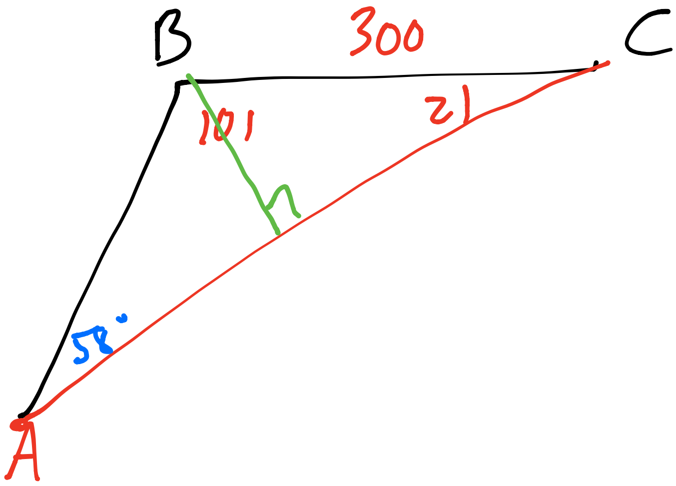


(Amori)

$\tan(21) = \frac{\text{opp}}{\text{adj}}$

(Leanne)

$101 + 21 = 122$

$180 - 122 = 58°$

(Whitney)

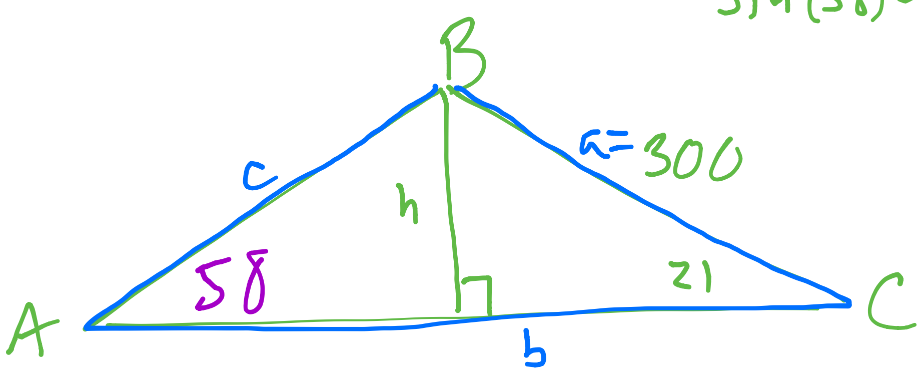
Found 58°

Made 2 right triangles

$\sin(21) = \frac{\text{height}}{\text{hypotenuse}}$

solved for height

$\sin(58) = \frac{\text{height}}{AB}$



$\sin(21) = \frac{h}{300}$ $\quad h = 300\sin(21)$

$\sin(58) = \frac{h}{AB}$

$\sin(58) = \frac{300\sin(21)}{AB}$ ... $\frac{300\sin(21)}{\sin(58)} = AB$

$$\sin(21) = \frac{h}{300}$$

$$\sin(58) = \frac{h}{AB}$$

$$\sin(58) = \frac{h}{c}$$

$$h = 300\sin(21)$$

$$h = c \cdot \sin(58)$$

$$300\sin(21) = c \cdot \sin(58)$$

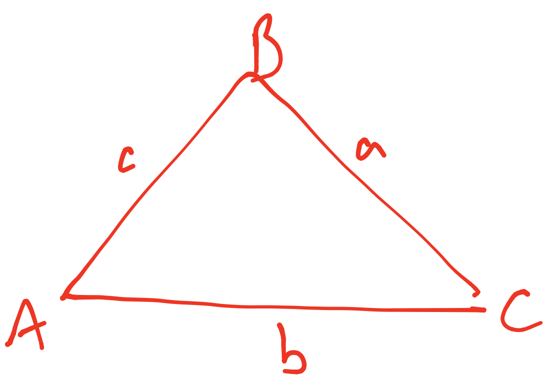
$$a\sin(\angle C) = c\sin(\angle A)$$

Trying to solve for side c.

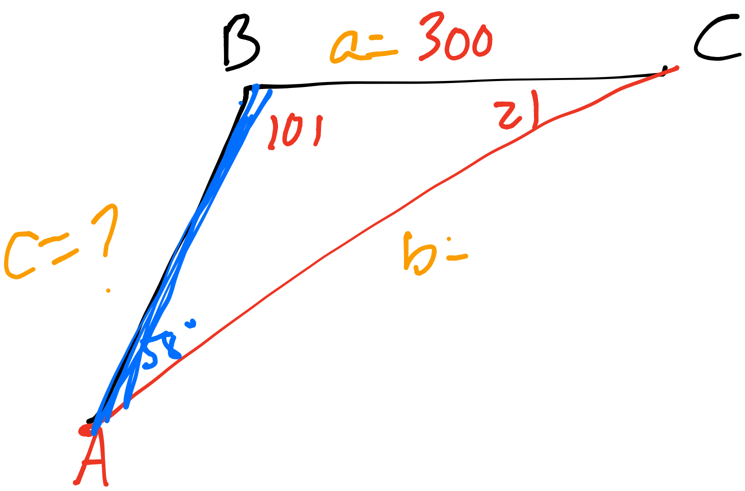
$$\frac{a\sin(\angle C)}{\sin(\angle A)} = c$$

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

* The law of sines



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



AB is opposite
∠C

c is opposite
of ∠C

Needed to find
3rd angle

$$\frac{\sin(58)}{300} = \cancel{\frac{\sin(101)}{b}} = \frac{\sin(21)}{c}$$

$$\frac{\sin(58)}{300} = \frac{\sin(21)}{c}$$

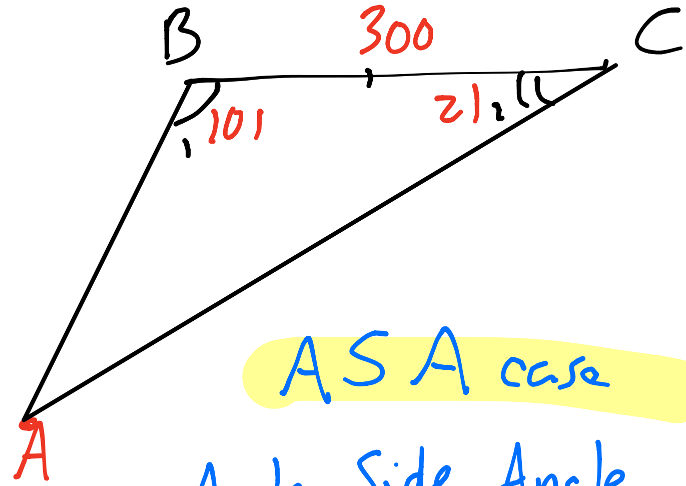
$$\frac{300\sin(21)}{\sin(58)} = \frac{c\cancel{\sin(58)}}{\cancel{\sin(58)}}$$

$$\frac{300\sin(21)}{\sin(58)} = c$$

$$126.77 \approx c$$

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

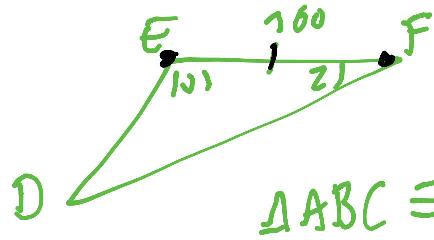
$$\frac{\sin(58)}{300} = \frac{\sin(21)}{c}$$



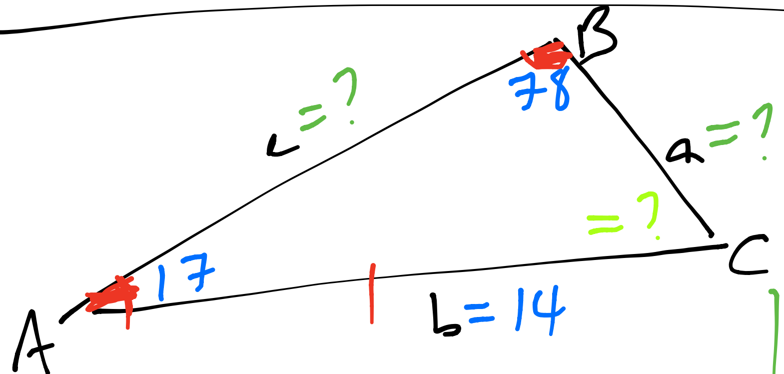
ASA case

Angle Side Angle

Recall



$\Delta ABC \cong \Delta DEF$ by ASA



AAS case

Angle Angle sid

$$m(\angle C) = 180 - (78+17)$$
$$= 85^\circ$$

$$\frac{\sin(78)}{14} = \frac{\sin(85)}{c}$$

$$c\sin(78) = 14\sin(85)$$

$$c = \frac{14\sin(85)}{\sin(78)} \approx 14.258$$

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

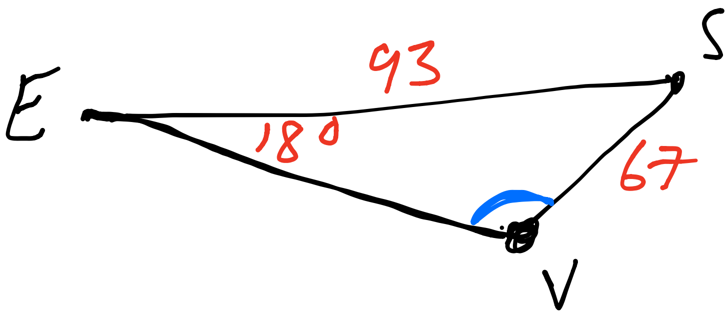
$$\frac{\sin(\angle 17)}{a} = \frac{\sin(78)}{14}$$

$$\frac{a\,\cancel{\sin(78)}}{\cancel{\sin(78)}} = \frac{14\sin(17)}{\sin(78)}$$ ← real value

$$a \approx 4.185$$ ← approximated value

AAS case
ASA case → LAW of Sines

SSA case
Side Side Angle



Find $\angle V$

$$\frac{\sin(18)}{67} = \frac{\sin(\angle V)}{93}$$

$$67\sin(\angle V) = 93\sin(18)$$

$$\sin(\angle V) = +\frac{93\sin(18)}{67}$$

Trig Equation

$$\sin^{-1}(\sin(\angle V)) = \sin^{-1}\left(\frac{93\sin(18)}{67}\right)$$

$m(\angle V) \approx 25.4°$ ← in QI $(0, 90°)$

in QII $(90°, 180°)$ $\approx 180° - 25.4° \approx 154.6°$

Try to find ($\angle S$), Test both cases

Let $\angle V = 25.4 \rightarrow 180 - (25.4 + 18) = 136.6°$

$\rightarrow$ 25.4 is a solution

Let $\angle V = 154.6 \rightarrow 180 - (154.6 + 18) = 7.4°$

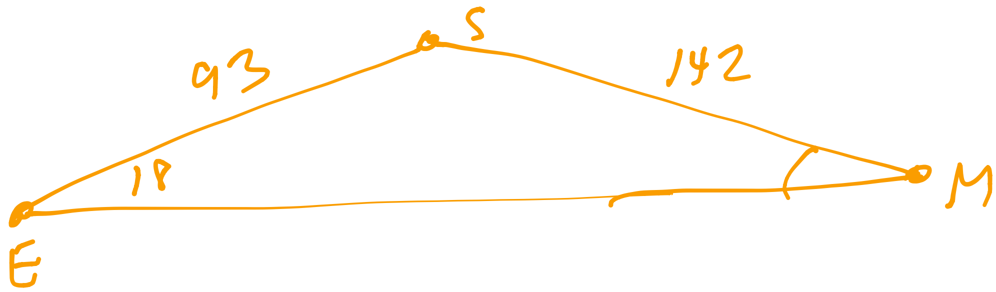
$\rightarrow$ 154.6 is also a solution

$\therefore m(\angle V) = 25.4°, 154.6°$

SSA case gives 0 solutions

1 solution

2 solutions



$$\frac{\sin(18)}{142} = \frac{\sin(M)}{93}$$

$\vdots$

$$\sin(M) = \frac{93\sin(18)}{142} \approx 11.7^\circ \text{ in QI}$$

$$\approx 180-11.7 \approx 168.3^\circ \text{ in QII}$$

Try to find $\angle S$

$\angle M = 11.17^\circ \rightarrow 180-(18+11.7) = 150.3$

$\angle M = 168.3^\circ \rightarrow 180-(18+168.3) = -6.3$

rejected

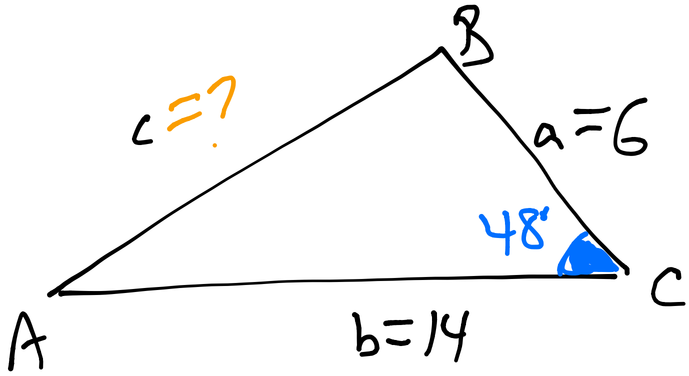
negative angle

$\therefore \angle M = 11.17^\circ$

SSA case: 0 solutions

$\sin\theta > 1$ or $\sin\theta < -1$

No solutions



SAS case

use law of cosines

Law of Cosines

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

$$c^2 = (6)^2 + (14)^2 - 2(6)(14)\cos(48)$$

$$c^2 = 36 + 196 - 168\cos(48)$$

$$c^2 = 232 - 168\cos(48)$$

$$c = \sqrt{232 - 168\cos(48)}$$ ← Reject Negative (side length

$$c \approx 119,586$$

Law of Cosines (for a side)

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

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

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

Law of Cosines (for angle

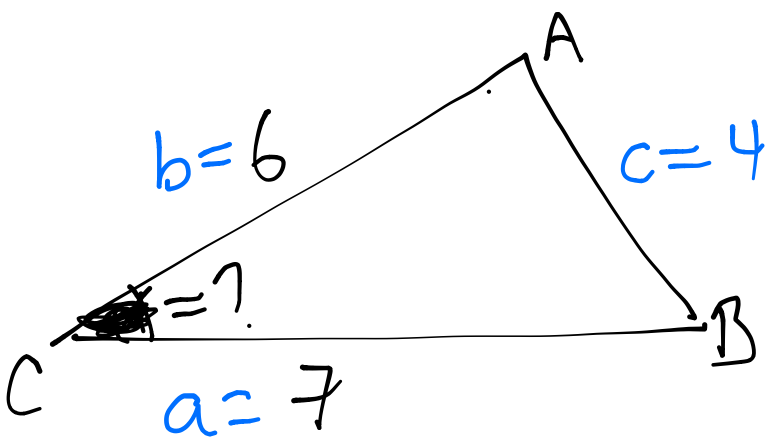
$$c^2 = (a^2+b^2) - 2ab\cos(\angle C)$$

$$\frac{c^2-(a^2+b^2)}{-2ab} = \frac{\cancel{-2ab}\cos(\angle C)}{\cancel{-2ab}}$$

$$\frac{c^2-(a^2+b^2)}{-2ab} = \cos(\angle C)$$

$\downarrow$

$$\cos(\angle C) = \frac{a^2+b^2-c^2}{2ab}$$



SSS case

Use law of cosines

$$\cos(\angle C) = \frac{a^2+b^2-c^2}{2ab}$$

$$\cos(\angle C) = \frac{(7)^2+(6)^2-(4)^2}{2(7)(6)}$$

$$\cos(\angle C) = \frac{23}{28}$$

$m(\angle C) = \cos^{-1}\left(\frac{23}{28}\right)$

$m(\angle C) \approx 34{,}772^\circ$ in QI $(0, 90^\circ)$

don't need to → QIV $(270^\circ, 360^\circ)$

above 180°