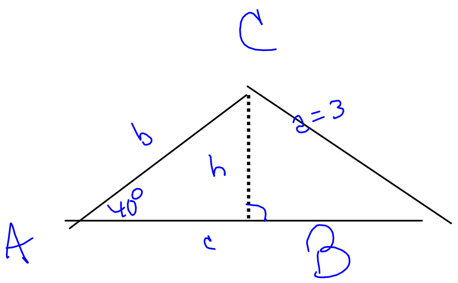


$a \geq h \Rightarrow$ at least one sol'n

$a = h \Rightarrow 1$

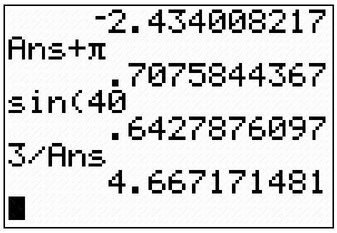
$a > h$ & $a < b \Rightarrow 2$

$a > h$ & $a > b \Rightarrow 1$

$\frac{h}{b} = \sin 40°$

$h = b \sin 40°$

$\approx b(.6427876097)$



$a > h$:

$a > .64\ldots b$

$\frac{3}{.64\ldots} = \frac{a}{.64\ldots} > b$

$4.667171481 > b$ guarantees 1 or 2 solutions.

2 sol'ns : want $a < b$ & $a > h$

$b > 3$ does it, as long as $b < 4.66\ldots$

1 solution

$a \geq b$ so $\boxed{b \leq 3}$

No sol'n! $h > a$

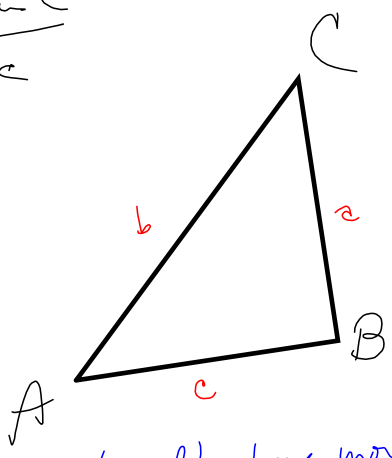
$h = b \sin 40°$

$\boxed{b > 4.667171481}$

On a test, you'll be given the a,b and A and YOU decide which of the 3 possibilities you're facing.

Law of Sines:

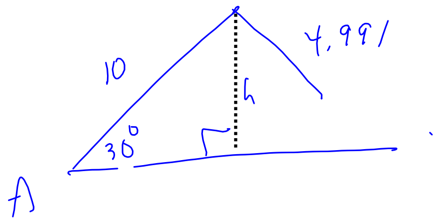
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



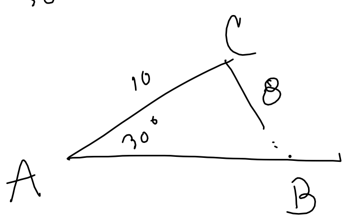
When can law of sines solve the triangle?

Pretty much ASA, AAS

ASS is bad/ambiguous/could have more than one sol'n.



2-sol'n case



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

$$\frac{\sin 30°}{8} = \frac{\sin B}{b}$$

$$\cancel{b = \frac{8 \sin B}{\sin 30°}}$$ You have b=10, idiot.

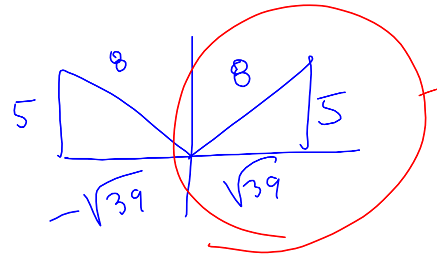
$$\frac{\sin 30°}{8} = \frac{\sin B}{10} \Rightarrow \sin B = \frac{10 \sin 30°}{8} = \frac{5 \cdot \frac{1}{2}}{4}$$

$$\sin B = \frac{5}{8}$$

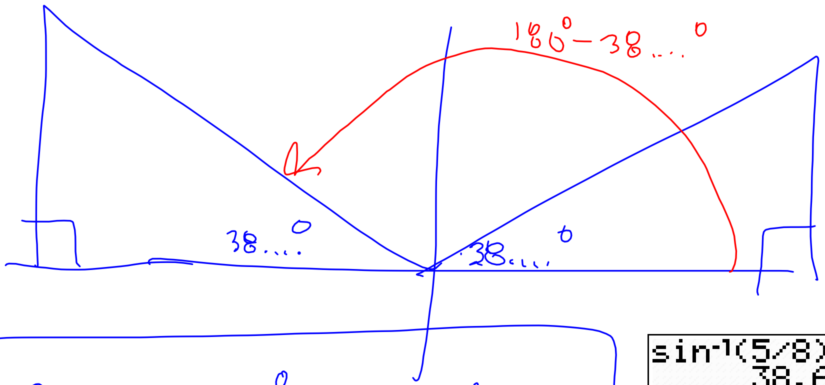
```
sin⁻¹(5/8)
        38.68218745
```

$$\Rightarrow B \approx 38.68218745°$$

Visualizing the 2nd solution situation:



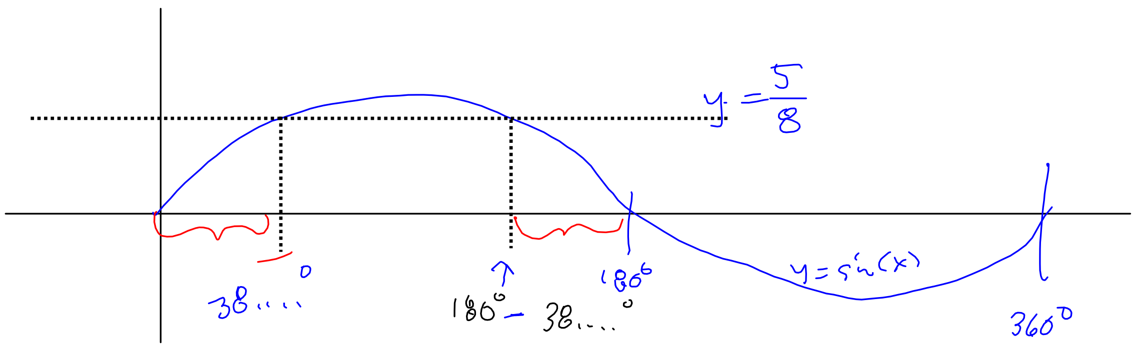
calculator only sees this one.
We know that the 2^{nd} one is in QII & has the same reference angle

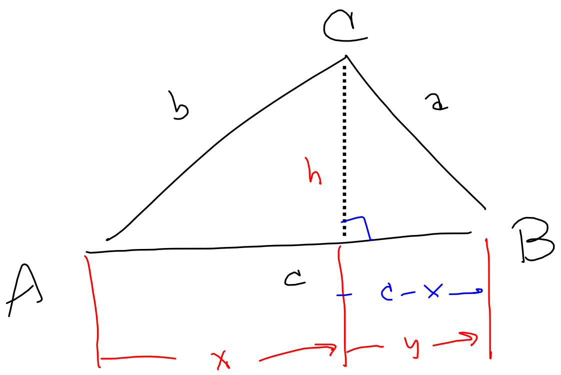


$B \approx 38.6822^\circ$ to 4 places
or $B \approx 141.3178^\circ$

```
sin⁻¹(5/8)
          38.68218745
Ans-180
         -141.3178125
```

Picture:





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

Bag this.
Too ambitious.
Teacher will derive this in video, because he's gonna be slow in real time.

$c^2 = (x+y)^2$

$a^2 = b^2 + c^2 - 2bc\cos A$ is probably better for the diagram to the derivation.

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

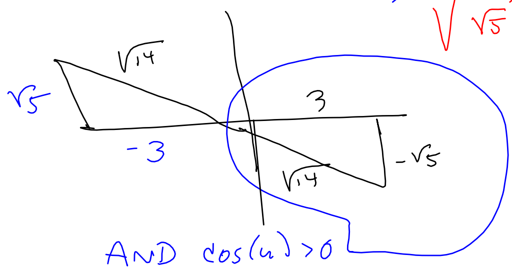
(3) $\tan(u) = -\frac{\sqrt{5}}{3}$, $\cos(u) > 0$

Find $\sin\left(\frac{u}{2}\right)$, $\cos\left(\frac{u}{2}\right)$ & $\tan\left(\frac{u}{2}\right)$

$\tan(u) = -\frac{\sqrt{5}}{3}$

$\sqrt{\sqrt{5}^2 + 3^2} = \sqrt{5+9}$

$= \sqrt{14}$



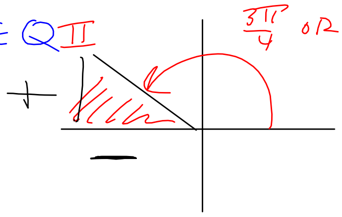
So, $u \in QIV$ $\quad \frac{3\pi}{2} < u < 2\pi$

$270^\circ < u < 360^\circ$

$\frac{3\pi}{4} < \frac{u}{2} < \pi$

$\frac{u}{2} \in QII$

$\frac{3\pi}{4}$ or 135°



So, $\sin\left(\frac{u}{2}\right) > 0$

& $\cos\left(\frac{u}{2}\right) < 0$

$$\sin\left(\frac{u}{2}\right) = +\sqrt{\frac{1-\cos(u)}{2}} = \sqrt{\frac{1-\frac{3}{\sqrt{14}}}{2}}$$

$$= \sqrt{\frac{\frac{\sqrt{14}-3}{\sqrt{14}}}{2}} = \sqrt{\frac{\sqrt{14}-3}{2\sqrt{14}}}$$

Most of it.

$$= \sqrt{\left(\frac{\sqrt{14}-3}{2\sqrt{14}}\right)\left(\frac{\sqrt{14}}{\sqrt{14}}\right)} = \sqrt{\frac{14-3\sqrt{14}}{2\cdot 14}} = \sqrt{\frac{14-3\sqrt{14}}{2\cdot 2\cdot 7}}$$

$$= \frac{\sqrt{14-3\sqrt{14}}}{\sqrt{2\cdot 2\cdot 7}}\left(\frac{\sqrt{7}}{\sqrt{7}}\right) = \frac{\sqrt{(14-3\sqrt{14})(7)}}{\sqrt{2\cdot 2\cdot 7\cdot 7}} = \frac{\sqrt{98-21\sqrt{14}}}{2\cdot 7}$$

$$= \boxed{\frac{\sqrt{98-21\sqrt{14}}}{14} = \sin\left(\frac{u}{2}\right)}$$

$$\boxed{\cos\left(\frac{u}{2}\right) = -\frac{\sqrt{98+21\sqrt{14}}}{14}}$$

I hate Garrett.

$$\tan\left(\frac{u}{2}\right) = -\frac{\sqrt{98-21\sqrt{14}}}{\sqrt{98+21\sqrt{14}}} = \boxed{\frac{\sqrt{70}-3\sqrt{5}}{5}}$$