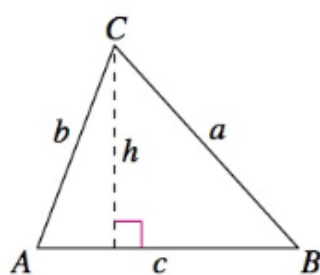


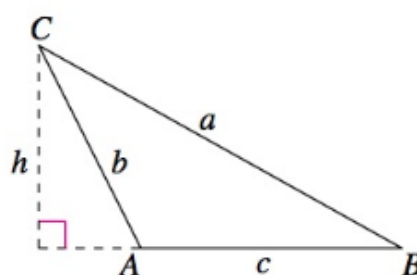
Law of Sines (p. 262)

If ABC is a triangle with sides a , b , and c , then

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



A is acute.



A is obtuse.

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

$$h = b \sin A$$

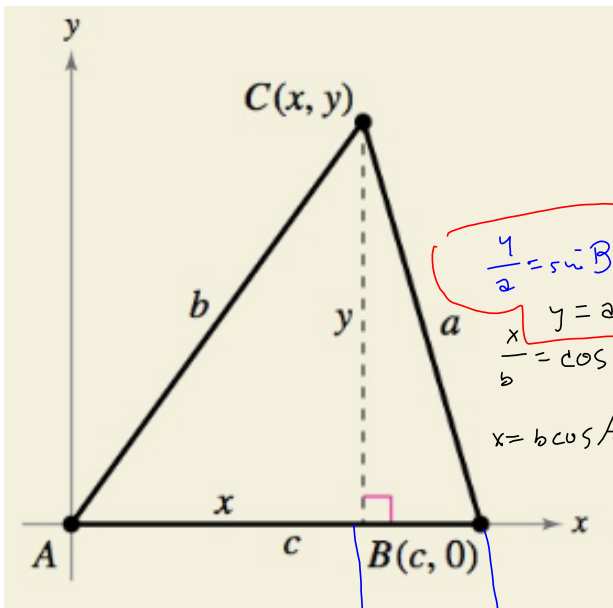
$$\frac{h}{a} = \sin B$$

$$h = a \sin B$$

$$h = h$$

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

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



$$\frac{y}{a} = \sin B$$

$$y = a \sin B = b^2$$

$$\frac{x}{b} = \cos A$$

$$x = b \cos A$$

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

$$= x^2 - 2xc + c^2 + (a \sin B)^2$$

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

$$\frac{y}{b} = \sin A$$

$$y = b \sin A$$

$$b^2 \sin^2 A$$

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

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

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

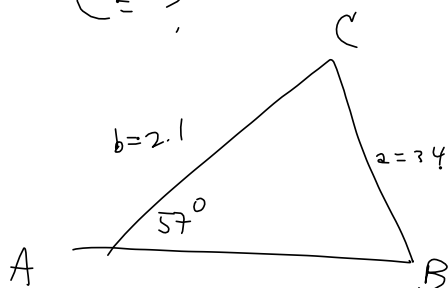
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$(c-x)^2 = c^2 - 2cx + x^2$$

$$((-1)(x-c))^2 = (-1)^2 (x-c)^2 = (x-c)^2 = x^2 - 2xc + c^2$$

§

$$\begin{array}{ll} A = 57^\circ & a = 34 \\ B = ? & b = 21 \\ C = ? & \end{array}$$



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

$$\sin B = \frac{b \sin A}{a} = \frac{21 \sin 57^\circ}{34} \approx .518 \dots$$

$$\text{So } B = \sin^{-1}(.518 \dots) \approx 31.19835222^\circ$$

118.1255057
Ans/2
59.06275285
21sin(57)/34
.5180024096
sin ⁻¹ (Ans)
31.19835222

§3.1 #4

$$A = 78^\circ 20'$$

$$C = 50.4^\circ$$

$$c = 13.1$$

20' 20 minutes

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

$$a = \frac{c \sin A}{\sin C} = \frac{13.1 \sin(78^\circ + (\frac{20}{60})^\circ)}{\sin(50.4^\circ)} \approx 16.65041096$$

$$\approx 16.65 \approx a$$

```
13.1sin(78+1/3)/
sin(50.4)
16.65041096
```

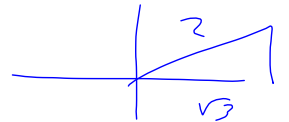
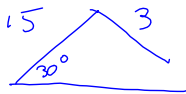
ASA, AAS

ASS is Ambiguous situation.

one sol'n?

2 sol'ns?

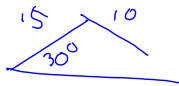
0 sol'n?



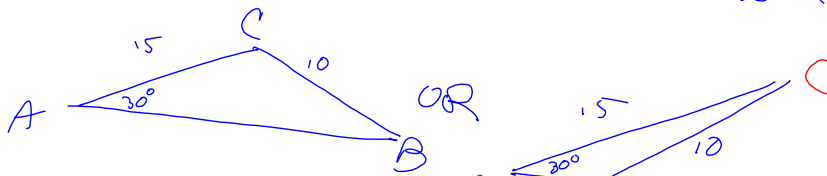
$$\frac{h}{15} = \sin 30^\circ = \frac{1}{2}$$

$h = \frac{15}{2} = 7.5 > 3$ so 3 is too short to even reach!

No Sol'n



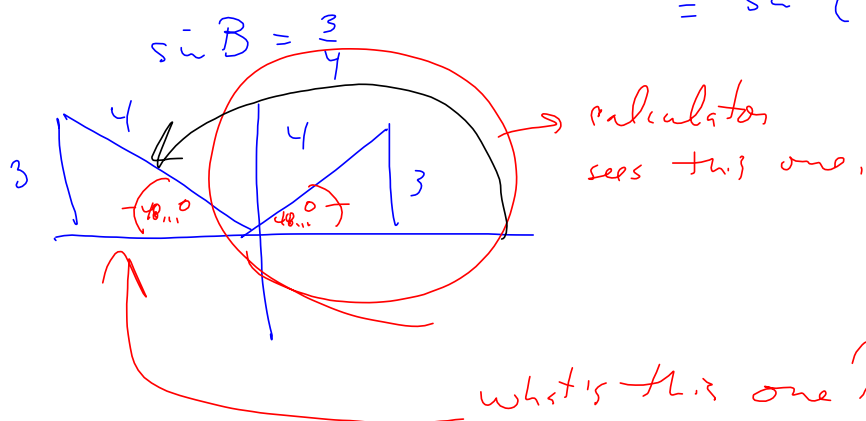
$h = 7.5 < 10$ so 10 is long enough. ALSO. There are 2 sol'ns.



$$\frac{\sin B}{15} = \frac{\sin A}{10}$$

$$\sin B = \frac{15 \sin A}{10}$$

$$\begin{aligned}\sin^{-1}(\sin B) &= \sin^{-1}\left(\frac{15\left(\frac{1}{2}\right)}{10}\right) = \sin^{-1}\left(\frac{3}{2} \cdot \frac{1}{2}\right) \\ &= \sin^{-1}\left(\frac{3}{4}\right) \approx 48.59\dots^\circ\end{aligned}$$



The other one is $180^\circ - 48.59\dots^\circ$

```
sin-1(3/4)
48.59037789
Ans-180
-131.4096221
■
```

So $B \approx 48.590^\circ$ or
 $B \approx 131.410^\circ$

