

# Notes: Law of Sines (The Ambiguous Case)

The Bad word is when give SSA

→ These triangles can give

- 0 solutions
- 1 solution
- 2 solutions

no A

Example 1  $A = 85^\circ$   $a = 15$   
 $B =$   $b = 25$   
 $C =$   $c =$

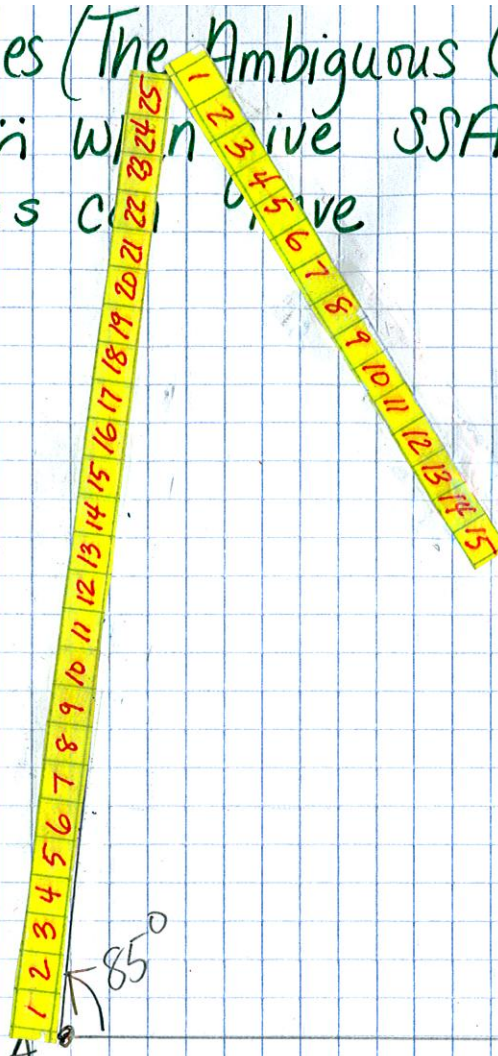
$$\frac{15}{\sin 85^\circ} = \frac{25}{\sin B}$$

$$15 \sin B = 25 \sin 85^\circ$$

$$\sin B = \frac{25 \sin 85^\circ}{15}$$

$$B = \sin^{-1} \left( \frac{25 \sin 85^\circ}{15} \right)$$

No Solution ERROR



Example 2  $A = 42^\circ$   $a = 22$   
 $B = 21.41^\circ$   $b = 12$   
 $C = 116.59^\circ$   $c = 26.07$

now check  
 is there a 2nd triangle

$A = 42^\circ$   $a = 22$  one  
 $B = 158.59^\circ$   $b = 12$  A  
 $C =$   $c =$

$180^\circ - 21.41^\circ =$   
 $180 - 42 - 158.59 = \text{neg}$   
 then no 2nd triangle

$$\frac{22}{\sin 42^\circ} = \frac{12}{\sin B}$$

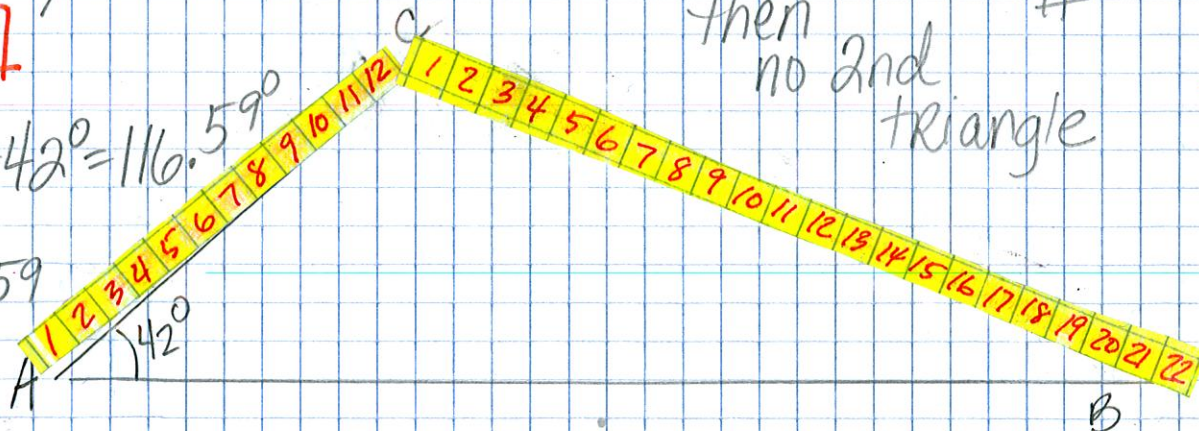
$$B = \sin^{-1} \left( \frac{12 \sin 42^\circ}{22} \right)$$

$$B = 21.41^\circ$$

$$C = 180^\circ - 21.41^\circ - 42^\circ = 116.59^\circ$$

$$\frac{22}{\sin 42^\circ} = \frac{c}{\sin 116.59^\circ}$$

$$c = 26.07$$



Example 3  $A = 20.5^\circ$   $a = 12$   
 $B = 64.78^\circ$   $b = 31$   
 $C = 94.71^\circ$   $c = 34.15$

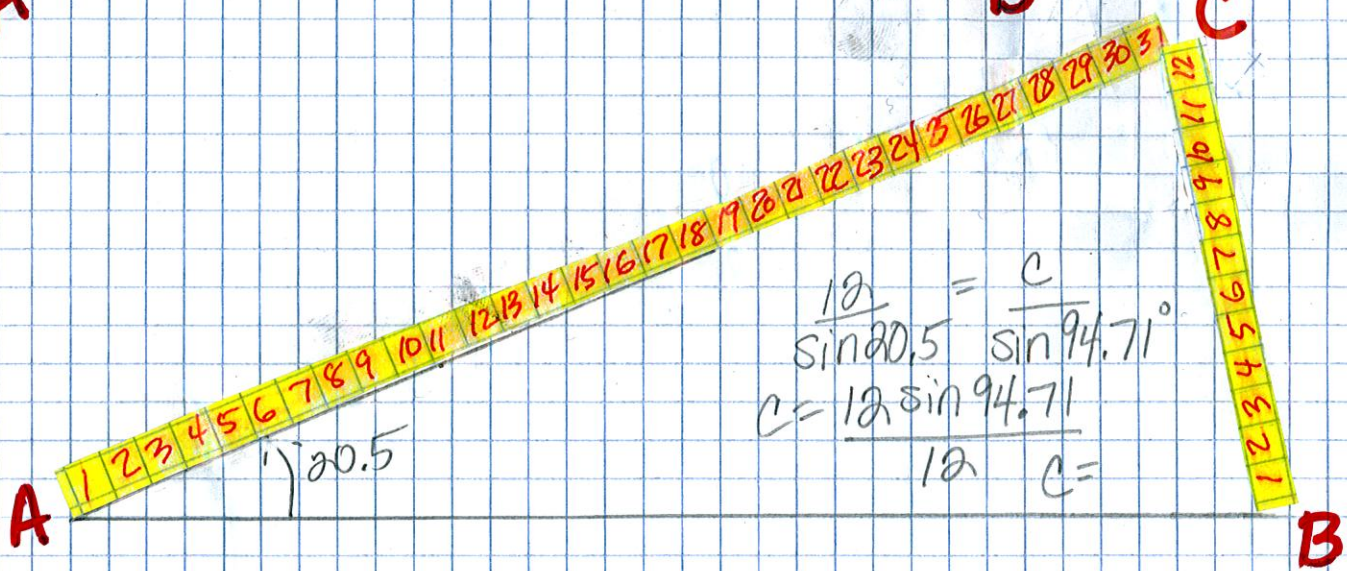
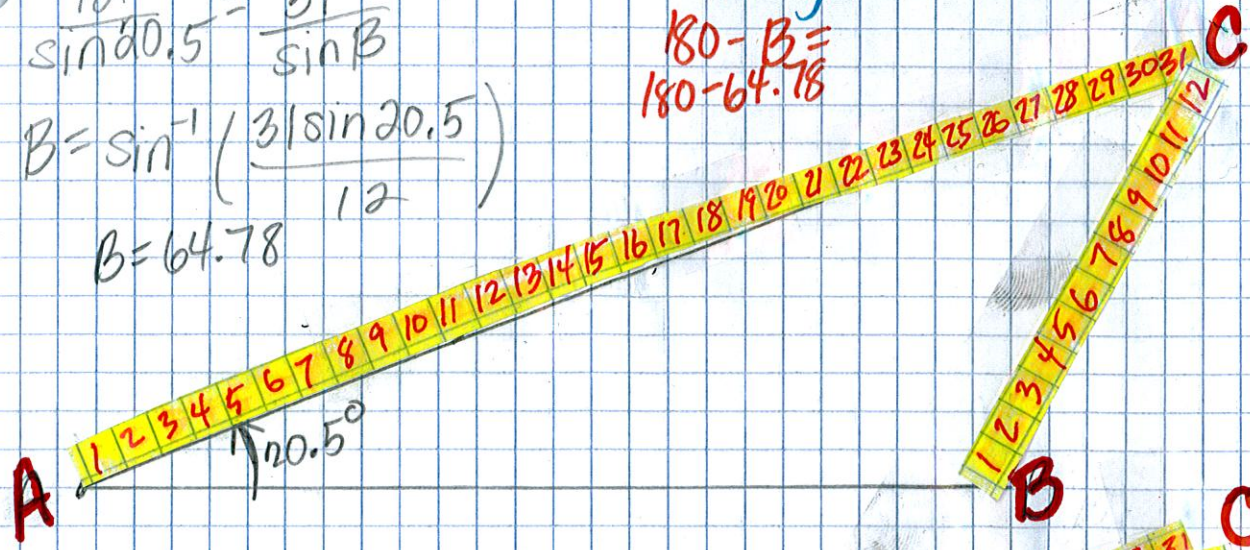
now check  
 is there  
 a 2nd  
 triangle  
 $180 - B =$   
 $180 - 64.78$

$A = 20.5^\circ$   $a = 12$   
 $B = 115.22^\circ$   $b = 31$   
 $C = 44.28^\circ$   $c = 23.92$

$$\frac{12}{\sin 20.5} = \frac{31}{\sin B}$$

$$B = \sin^{-1} \left( \frac{31 \sin 20.5}{12} \right)$$

$$B = 64.78$$



$$\frac{12}{\sin 20.5} = \frac{c}{\sin 94.71}$$

$$c = \frac{12 \sin 94.71}{\sin 20.5}$$

$$c = 23.92$$