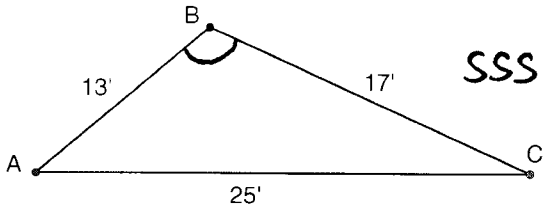
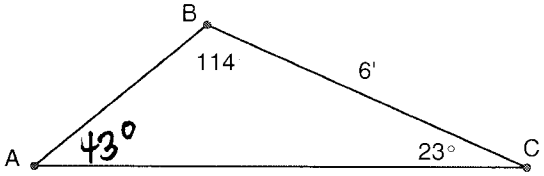
The Law of Sines and Cosines #2 ROUND TO 100THS Name_____

Find the missing part:



SSS



ASA

1. Find measure of angle B

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

$25^2 = 17^2 + 13^2 - 2(17)(13)\cos\angle B$

$\frac{167}{-442} = \cos\angle B$

$\angle B = \cos^{-1}\left(\frac{167}{-442}\right) \approx 112.20$

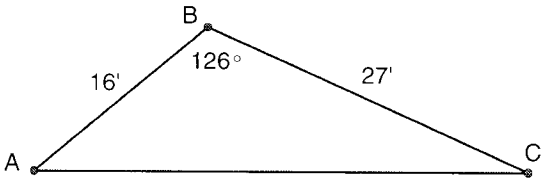
$\boxed{\angle B \approx 112.20^\circ}$

2. Find the length of AC

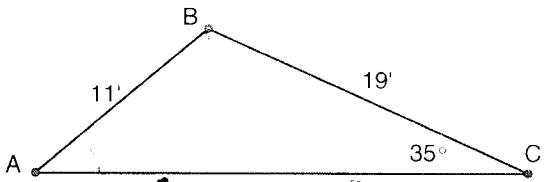
$\frac{\sin 43^\circ}{6} = \frac{\sin 114^\circ}{AC}$

$AC = \frac{6 \cdot \sin 114^\circ}{\sin 43^\circ}$

$\boxed{\overline{AC} \approx 8.04'}$



SAS



↑ 1ST CASE

3. Find the length of AC

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

$b^2 = 27^2 + 16^2 - 2(27)(16)\cos 120^\circ$

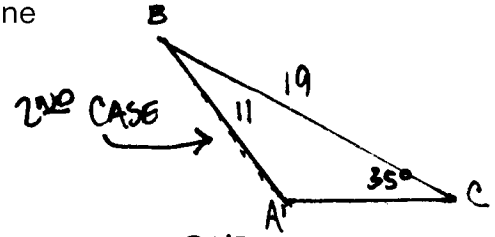
$b^2 = 1417$

$b \approx 37.64$

$\boxed{\overline{AC} \approx 37.64'}$

8

4. Draw the two possible triangles given these conditions, and find the measure of angle B in each one



1ST CASE

$\frac{\sin A}{19} = \frac{\sin 35^\circ}{11}$

$\sin A = \frac{19 \cdot \sin 35^\circ}{11}$

$\angle A = \sin^{-1}\left(\frac{19 \cdot \sin 35^\circ}{11}\right)$

$\angle A \approx 82.19^\circ$

$\therefore \angle B \approx 62.81^\circ$

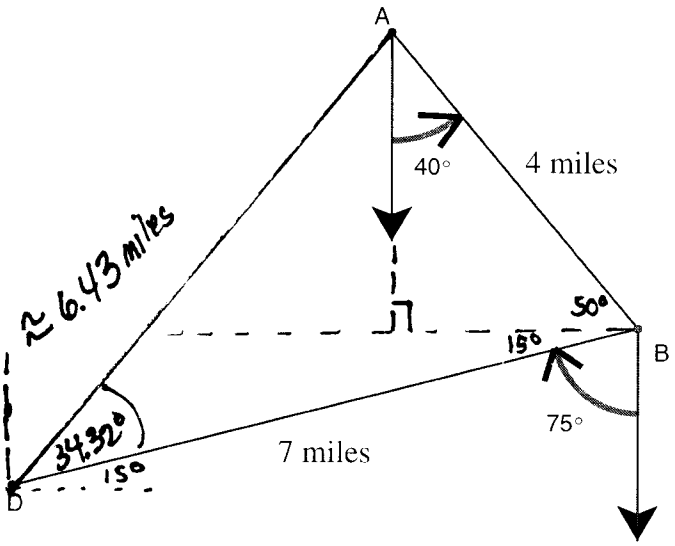
2ND CASE

$m\angle A' \approx 180 - 82.19$

$m\angle A' \approx 97.81^\circ$

$\boxed{\text{so } m\angle B \approx 47.19^\circ}$

5. Blake walks for 4 miles on a heading of S 40° E. Then he walks 7 miles on a heading of S 75° W. Find the direct distance that he is from where he started. Give the heading he would have to take in order to return from point D to point A.



$AD^2 = 4^2 + 7^2 - 2(4)(7)\cos 65°$

$AD^2 \approx 41.\ldots$

$AD \approx 6.43$

$\frac{\sin D}{4} = \frac{\sin 65°}{6.42910393}$

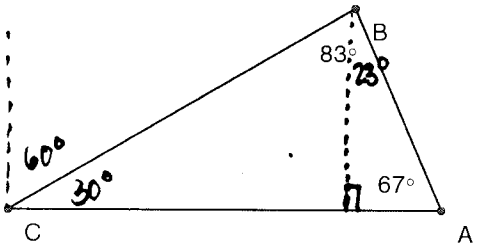
$D = \sin^{-1}\left(\frac{4 \cdot \sin 65°}{6.42910393}\right)$

$D \approx 34.32$

$\measuredangle D \approx 34.32° \rightarrow 90° - \measuredangle D - 15°$

N 40.68° E

6. A boat race started going directly west from starting point A. Give the headings needed from C to B and then from B back to A.

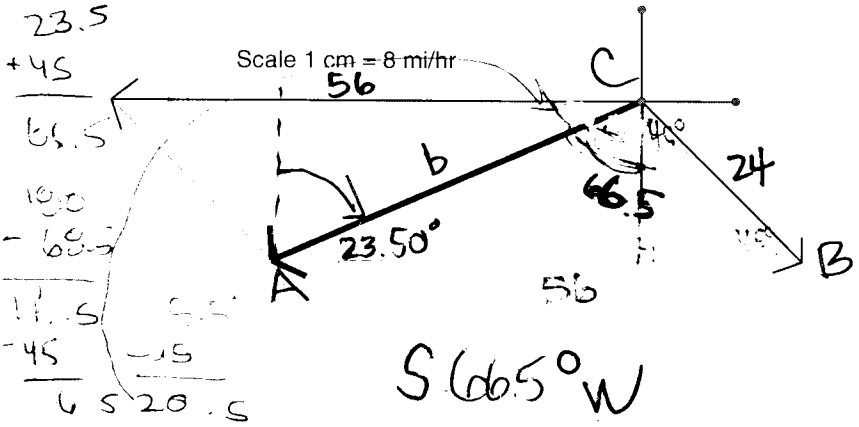


N
W E
S

N 60° E (FROM C TO B)

S 23° E (FROM B TO A)

7. A boat is traveling 56 miles per hour towards the west as a wind is blowing 24 miles per hour towards the southeast. Find the **exact speed** the boat is traveling and the heading it is using.



23.5
+ 45
68.5
180
- 68.5
111.5
- 45
66.5

S 66.5° W

$b^2 = 24^2 + 56^2 - 2(24)(56)\cos 45°$

$b^2 \approx 1811.30\ldots$

$b \approx 42.56$ mi/hr

$\frac{\sin \measuredangle A}{24} = \frac{\sin 45}{42.56\ldots}$

$\measuredangle A \approx 23.50°$

8. The law of sines can be applied to the cases of ASA, AAS, and SSA* while the law of cosines can be applied to the cases of SAS and SSS.

9. The sine of theta is a value that falls between -1 and 1 and includes -1 and 1 because these are the min & max values possible

10. The cosine of theta is a value that falls between -1 and 1 and includes -1 and 1 because these are the min & max values possible

11. Sydney typed the following into her calculator: $\sin^{-1}\left(\frac{15}{14}\right)$

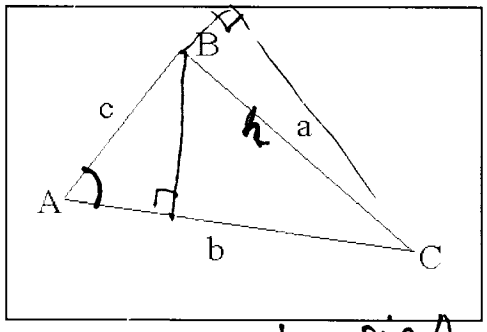
She received a message the said: "Non real calculation...To allow complex calculations, change the real or complex mode setting to RECTANGULAR or POLAR."

Explain why she received this message from her Nspire. AWV

hypotenuse can't be smaller than side opposite (SOH)

domain can't be >1

12. Given the following triangle, find the area of the triangle in three ways



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

i) with b as the base $= \frac{1}{2} a \cdot c \cdot \sin B$

ii) with c as the base $= \frac{1}{2} \cdot b \cdot c \sin C$

iii) with a as the base

Can you come with a rule that will work for ANY base? (Hint it involves a trig function)

$A = \frac{1}{2} xy \sin \angle Z$