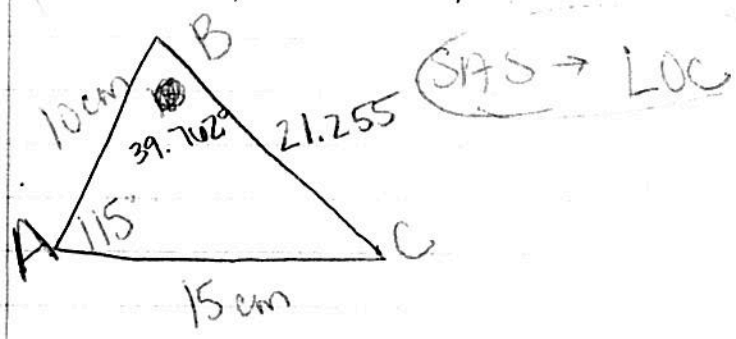


LOC/LOS Practice

* Calc. in Degree Mode! *

① $A = 115^\circ$, $b = 15 \text{ cm}$, $c = 10 \text{ cm}$

* Start w/ one law, stay w/ that law! *



* Truncate to 3 decimals

$$a = \sqrt{15^2 + 10^2 - 2(15)(10)\cos(115^\circ)}$$

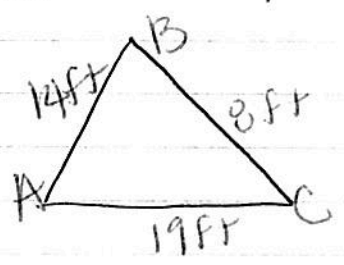
$$a = 21.255 \text{ cm}$$

$$B = \cos^{-1}\left(\frac{15^2 - 21.255^2 - 10^2}{-2(21.255)(10)}\right), \quad B = 39.702^\circ$$

$$C = 180 - 115 - 39.702, \quad C = 25.238^\circ$$

② $a = 8 \text{ ft}$, $b = 19 \text{ ft}$, $c = 14 \text{ ft}$

(SSS -> LOC)



$$B = \cos^{-1}\left(\frac{19^2 - 8^2 - 14^2}{-2(8)(14)}\right)$$

$$B = 116.800^\circ$$

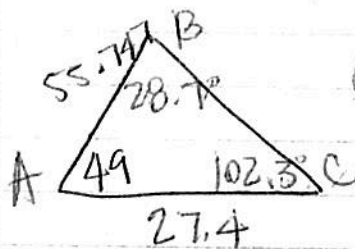
$$C = \cos^{-1}\left(\frac{14^2 - 8^2 - 19^2}{-2(8)(19)}\right)$$

$$C = 41.123^\circ$$

$$A = 180 - 116.8 - 41.123$$

$$A = 22.077^\circ$$

③ $C = 102.3^\circ$, $B = 28.7^\circ$, $b = 27.4$



AAS \rightarrow LOS

$$A = 180 - 102.3 - 28.7$$

$$A = 49^\circ$$

$$\frac{\sin 28.7}{27.4} = \frac{\sin 102.3}{c}$$

$$c = \frac{27.4 \sin 102.3}{\sin 28.7}$$

$$c = 55.747$$

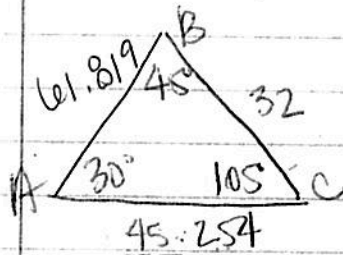
$$\frac{\sin 28.7}{27.4} = \frac{\sin 49}{a}$$

$$a = \frac{27.4 \sin 49}{\sin 28.7}$$

$$a = 43$$

④ $A = 30^\circ$, $B = 45^\circ$, $a = 32$

AAS \rightarrow LOS



$$C = 180 - 45 - 30 = 105^\circ$$

$$C = 105^\circ$$

$$\frac{\sin(30^\circ)}{32} = \frac{\sin 105}{c}$$

$$c = \frac{32 \sin 105}{\sin 30^\circ}$$

$$c = 61.819$$

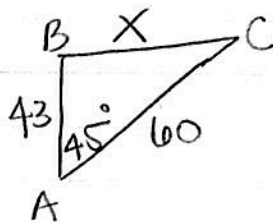
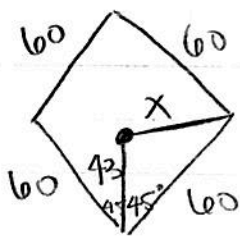
$$\frac{\sin 30}{32} = \frac{\sin 45}{b}$$

$$b = \frac{32 \sin 45}{\sin 30}$$

$$b = 45.254$$

5) A pitcher's mound on a woman's softball field is 43 feet from home plate and the distance between the bases is 60 feet. (The pitcher's mound is not halfway between home plate and second base.) How far is the pitcher's mound from first base?

* Softball fields are diamonds (all rt. \angle s)

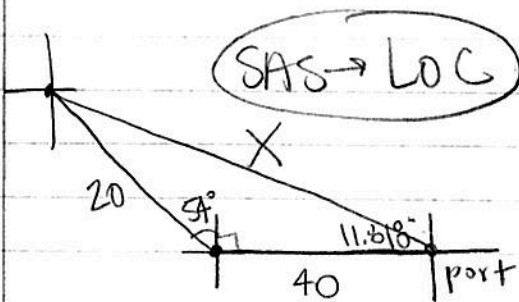


SAS \rightarrow LOC

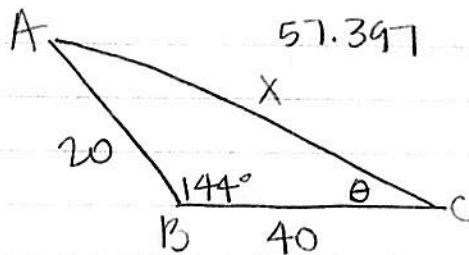
$$a = \sqrt{60^2 + 43^2 - 2(60)(43)\cos(45^\circ)}$$

$$a = 42.430 \text{ ft}$$

6) A ship leaves port at noon and heads due west at 20 knots (20 nautical miles per hour). At 2 pm, the ship changes course to N 54° W. At 3 pm, the ship returns to its port of departure. Find the ship's bearing and distance from the port.



SAS \rightarrow LOC



$$X = \sqrt{40^2 + 20^2 - 2(40)(20)\cos(144^\circ)}$$

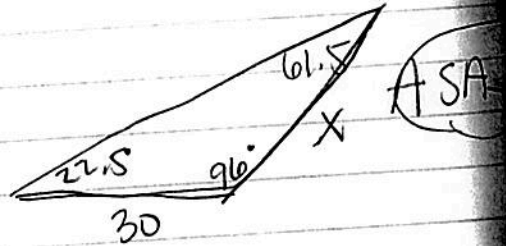
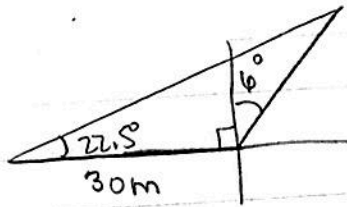
$$X = 57.397 \text{ mi}$$

$$C = \cos^{-1}\left(\frac{20^2 - 40^2 - 57.397^2}{-2(40)(57.397)}\right)$$

$$C = 11.818^\circ \rightarrow$$

Bearing = 281.818°
 Heading = N 78.182° W

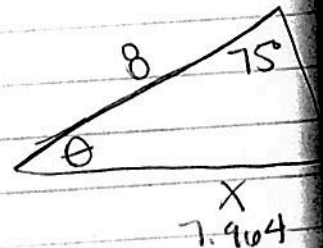
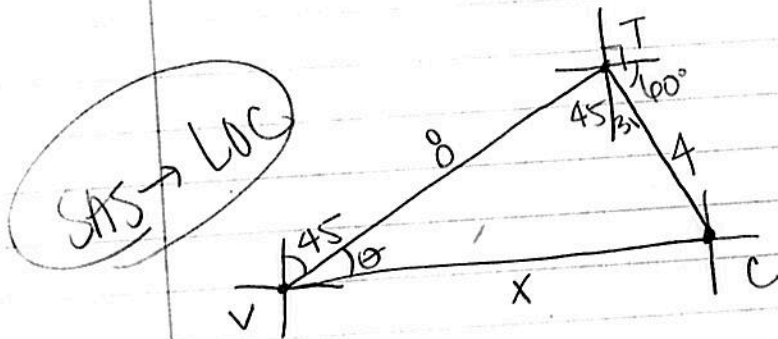
7) Because of prevailing winds, a tree grew so that it was leaning 6° from the vertical. At a point from the tree, the angle of elevation to the top of the tree is 22.5° . Find the length of the tree.



$$\frac{\sin(61.5)}{30} = \frac{\sin(22.5)}{X}$$

$$X = \frac{30 \sin(22.5)}{\sin(61.5)}, \quad \boxed{X = 13.063 \text{ m}}$$

8) Town T is 8 km northeast ($N 45^\circ E$) of Village V. City C is 4 km from T on a bearing of 150° is the bearing and the distance of C from V?



$$X = \sqrt{8^2 + 4^2 - 2(8)(4) \cos(75^\circ)}$$

$$\boxed{X = 7.964 \text{ km}}$$

$$\boxed{\text{Bearing} = 74.02^\circ}$$

$$A = \cos^{-1} \left(\frac{4^2 - 7.964^2 - 8^2}{2(7.964)(8)} \right), \quad \theta = 29.020^\circ + 45^\circ = 74.020^\circ$$