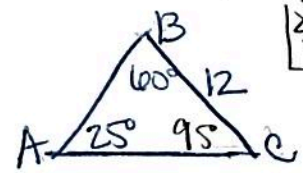
Pre-AP Precalculus

Name: Key

HW: Law of Sines and Cosines

For #1-10, use the Law of Sines or Cosines to solve the triangle.

1. $A = 25°,\ B = 60°,\ a = 12$ AAS → LOS

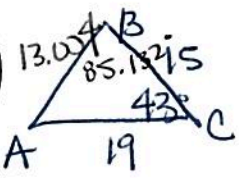


$\measuredangle C = 95°$

$\frac{\sin(25)}{12} = \frac{\sin(95)}{c}$ $\quad$ $\frac{\sin(25)}{12} = \frac{\sin(60)}{b}$

$c = 28.286$ $\quad$ $b = 24.590$

2. a=15, b=19. C=43 SAS → LOC



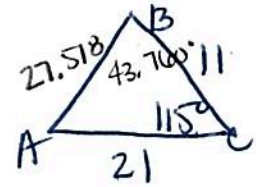
$c = \sqrt{15^2 + 19^2 - 2(15)(19)\cos(43°)}$

$c = 13.004$

$B = \cos^{-1}\left(\frac{19^2 - 15^2 - 13.004^2}{-2(15)(13.004)}\right)$

$\measuredangle B = 85.132°$ $\quad$ $\measuredangle A = 51.868°$

3. $C = 115°,\ a = 11,\ b = 21$ SAS → LOC



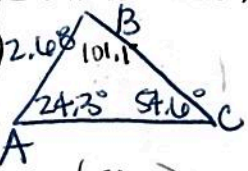
$c = \sqrt{11^2 + 21^2 - 2(11)(21)\cos(115)}$

$c = 27.518$

$\measuredangle B = \cos^{-1}\left(\frac{21^2 - 11^2 - 27.518^2}{-2(11)(27.518)}\right)$

$\measuredangle B = 43.760°$ $\quad$ $\measuredangle A = 21.24°$

4. $A = 24.3°,\ C = 54.6°,\ c = 2.68$ AAS → LOS

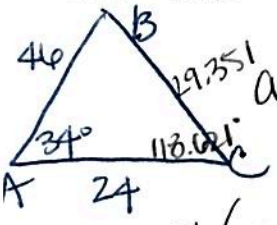


$\measuredangle B = 101.1°$

$\frac{\sin(54.6)}{2.68} = \frac{\sin(24.3)}{a}$ $\quad$ $\frac{\sin(54.6)}{2.68} = \frac{\sin(101.1)}{b}$

$a = 1.352$ $\quad$ $b = 3.226$

5. $A = 34°, b = 24, c = 46$ SAS → LOC



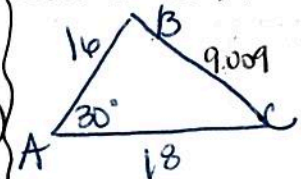
$a = \sqrt{24^2 + 46^2 - 2(24)(46)\cos(34°)}$

$a = 29.351$

$\measuredangle C = \cos^{-1}\left(\frac{46^2 - 24^2 - 29.351^2}{-2(24)(29.351)}\right)$

$\measuredangle C = 118.621°$ $\quad$ $\measuredangle B = 27.379°$

6. $A = 30°,\ b = 18,\ c = 16$ SAS → LOC



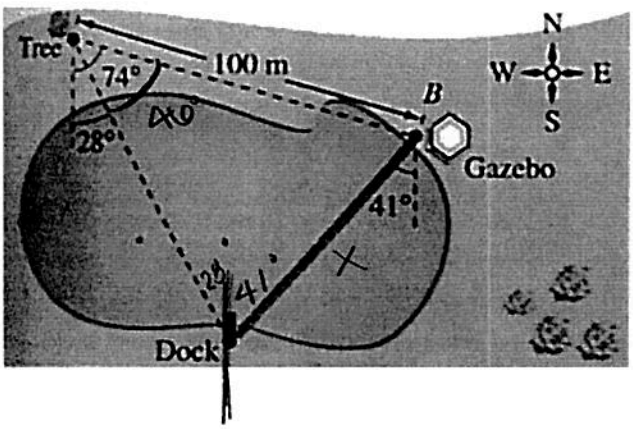
$a = \sqrt{16^2 + 18^2 - 2(16)(18)\cos 30}$

$a = 9.009$

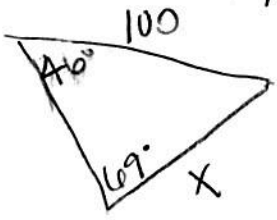
$B = \cos^{-1}\left(\frac{18^2 - 9.009^2 - 16^2}{-2(9.009)(16)}\right)$

$B = 87.383°$ $\quad$ $C = 62.617°$

7. A bridge is to be built across a small lake from a gazebo to a dock. The ~~bearing~~ heading from the gazebo to the dock is $S\ 41°\ W$. From a tree 100 meters from the gazebo, the ~~bearings~~ headings to the gazebo and the dock are $S\ 74°\ E$ and $S\ 28°\ E$, respectively. Find the distance from the gazebo to the dock.



AAS → LOS

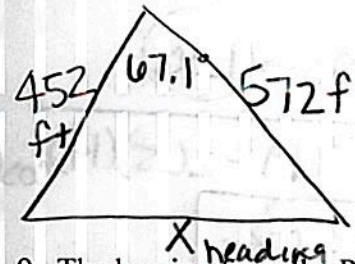


$\frac{\sin 69°}{100} = \frac{\sin 46°}{X}$

$X = \frac{100 \sin 46°}{\sin 69°}$

$X = 77.051\ m$

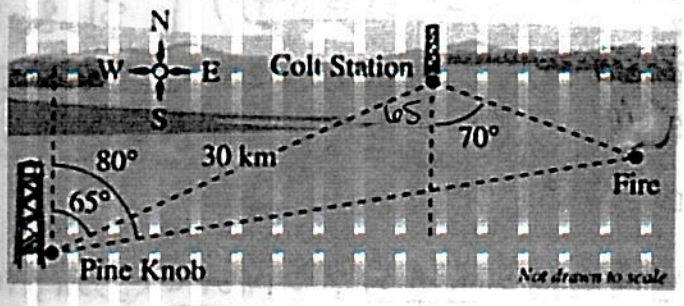
8. A triangular field is 452 ft on one side, and 572 ft on another. The sides meet at an angle of 67.1°
Find the length of the third side to the nearest foot. SAS → LOC



$X = \sqrt{452^2 + 572^2 - 2(452)(572)\cos(67.1°)}$

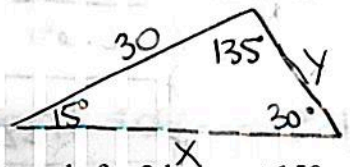
$X \approx 575$ ft.

9. The ~~bearing~~ heading from the Pine Knob fire tower to the Colt Station fire tower is $N\ 65°\ E$, and the two towers are 30 kilometers apart. A fire spotted by rangers in each tower has a bearing of $N\ 80°E$ from Pine Knob and $S\ 70°\ E$ from Colt Station. Find the distance of the fire from each tower. ASA - LOS



$\frac{\sin 30°}{30} = \frac{\sin 135°}{X}$

$X = \frac{30 \sin 135°}{\sin 30°}$, $X = 42.426$ km

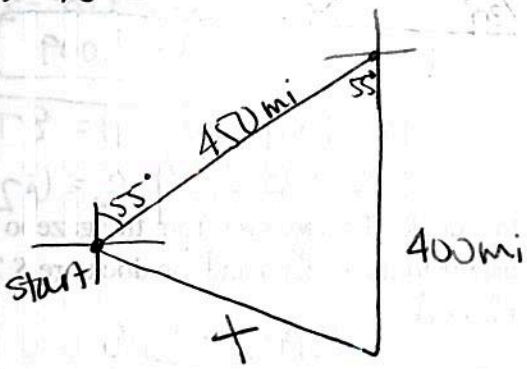


$\frac{\sin 30°}{30} = \frac{\sin 15°}{Y} \rightarrow Y = \frac{30 \sin 15°}{\sin 30°}$

$Y = 15.529$ km

10. A ship travels for 3 hours at 150 mph at a bearing of 55 before it turns and sails due south for 2 hours at 200 mph. After 5 hours, how far is the ship from where it started?

$3(150) = 450$ $\quad 2(200) = 400$ $\quad$ SAS → LOC



$X = \sqrt{450^2 + 400^2 - 2(450)(400)\cos(55°)}$

$X = 394.984$ mi