Precalculus Unit 6 Homework—Law of Sines

Solve each triangle. Round your answers to the nearest tenth.

1. $A = 126°, B = 20°, c = 18$ $C = 34°$ $a = 26.0$ $b = 11.0$

2. $A = 37°, c = 19, a = 11$ no soln.

3. $C = 27°, b = 11, c = 9$ $B = 33.7°$ $A = 119.3°$ $a = 17.3$
$B = 146.3°$ $A = 6.7°$ $a = 2.3$

4. $B = 47°, C = 28°, a = 37$ $A = 105°$ $b = 28.0$ $c = 18.0$

5. $A = 50°, c = 23, a = 6$ no soln.

6. $B = 83°, C = 43°, a = 13$ $A = 54°$ $b = 15.9$ $c = 11.0$

7. $C = 48°, A = 106°, c = 17$ $B = 26°$ $b = 10.0$ $a = 22.0$

8. $C = 112°, b = 24, c = 7$ no soln.

9. Aliens are on their way to earth to abduct Mr. Smith and Ms. Powell in order to study brilliant earthlings. Mr. Smith looks due east and sees the UFO with an angle of elevation of $40°$. At the same time Ms. Powell is 1 mile due west of Mr. Smith. When Ms. Powell looks due east she sees the same UFO at an angle of elevation of $25°$. Find the distance between Mr. Smith and the UFO. How far is the UFO above the ground?

1.63 mi 1.05 mi

10. Two lookout towers, L and M, are 50 km apart. The ranger in tower L sees a fire at point C such that $m\angle CLM = 40°$. The ranger in tower M sees the same fire such that $m\angle CML = 65°$. How far is the fire from tower L? 46.9 km

11. An aircraft is spotted by 2 observers who are 1000 feet apart. As the airplane passes over the line joining them, each observer takes a sighting of the angle of elevation to the plane. Person A, who is on the left, measures his sighting to be $40°$, whereas person B has a sighting of $35°$. How high is the airplane?

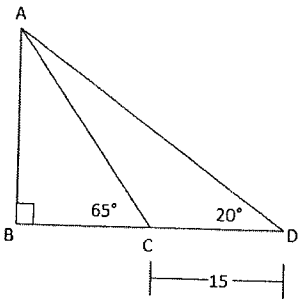
381.69 ft

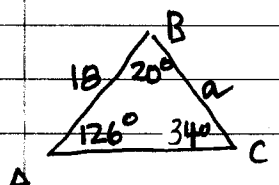
12. Tucker and Lilly are standing at the seashore 10 miles apart. The coastline is a straight line between them. Both can see the same ship in the water. The angle between the coastline and the line between the ship and Tucker is $35°$. The angle between the coastline and the line between the ship and Lilly is $45°$. How far are Tucker and Lilly from the ship?

7.18 mi 5.82 mi

13. Find BC.

3.07

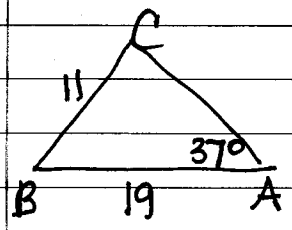


1. 

$\frac{\sin 34^\circ}{18} = \frac{\sin 126^\circ}{a}$ $\quad$ $\frac{\sin 34^\circ}{18} = \frac{\sin 20^\circ}{b}$

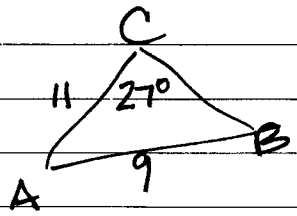
$a = \frac{18 \sin 126^\circ}{\sin 34^\circ}$ $\quad$ $b = \frac{18 \sin 20^\circ}{\sin 34^\circ}$

$a = 26.0$ $\quad$ $b = 11.0$

2. 

$\frac{\sin 37^\circ}{11} = \frac{\sin C}{19}$

$C = \sin^{-1}\left(\frac{19 \sin 37^\circ}{11}\right)$ no soln.

3. 

$\frac{\sin 27^\circ}{9} = \frac{\sin B}{11}$

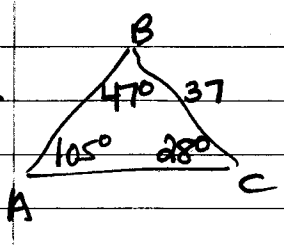
$B = \sin^{-1}\left(\frac{11 \sin 27^\circ}{9}\right)$

$B = 33.7^\circ$ OR 146.3°

$A = 119.3^\circ$ $\quad$ $A = 6.7^\circ$

$\frac{\sin 27^\circ}{9} = \frac{\sin 119.3^\circ}{c}$ $\quad$ $\frac{\sin 27^\circ}{9} = \frac{\sin 6.7^\circ}{c}$

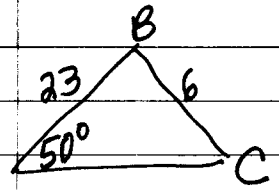
$c = \frac{9 \sin 119.3^\circ}{\sin 27^\circ} = 17.3$ $\quad$ $c = \frac{9 \sin 6.7^\circ}{\sin 27^\circ} = 2.3$

4. 

$\frac{\sin 105^\circ}{37} = \frac{\sin 47^\circ}{b}$ $\quad$ $\frac{\sin 105^\circ}{37} = \frac{\sin 28^\circ}{c}$

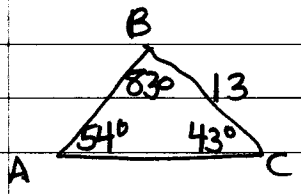
$b = \frac{37 \sin 47^\circ}{\sin 105^\circ}$ $\quad$ $c = \frac{37 \sin 28^\circ}{\sin 105^\circ}$

$b = 28.0$ $\quad$ $c = 18.0$

5. 

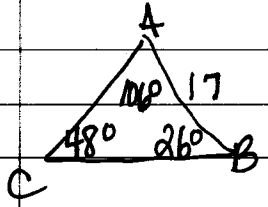
$\frac{\sin 50^\circ}{6} = \frac{\sin C}{23}$

$C = \sin^{-1}\left(\frac{23 \sin 50^\circ}{6}\right)$ no soln.

6. 

$\frac{\sin 54^\circ}{13} = \frac{\sin 83^\circ}{b}$ $\quad$ $\frac{\sin 54^\circ}{13} = \frac{\sin 43^\circ}{c}$

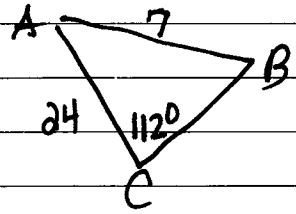
$b = \frac{13 \sin 83^\circ}{\sin 54^\circ} = 15.9$ $\quad$ $c = \frac{13 \sin 43^\circ}{\sin 54^\circ} = 11.0$

7. 

$\frac{\sin 48^\circ}{17} = \frac{\sin 26^\circ}{b}$ $\quad$ $\frac{\sin 48^\circ}{17} = \frac{\sin 106}{a}$

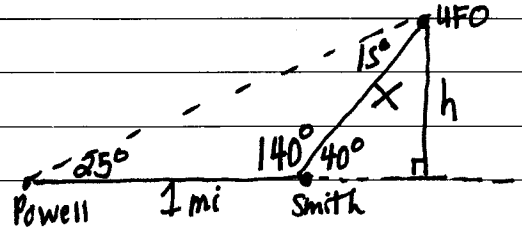
$b = \frac{17 \sin 26^\circ}{\sin 48^\circ}$ $\quad$ $a = \frac{17 \sin 106^\circ}{\sin 48^\circ}$

$b = 10.0$ $\quad$ $a = 22.0$

8. 

$\frac{\sin 112^\circ}{7} = \frac{\sin B}{24}$

$B = \sin^{-1}\left(\frac{24 \sin 112^\circ}{7}\right)$ no soln.

9. 

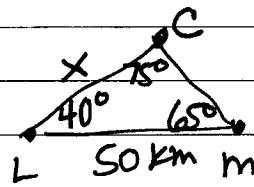
$180^\circ - 40^\circ = 140^\circ$

$180 - 140^\circ - 25^\circ = 15^\circ$

$\frac{\sin 25^\circ}{x} = \frac{\sin 15^\circ}{1}$

$\sin 40^\circ = \frac{h}{1.63}$ $\quad$ $x = \frac{\sin 25^\circ}{\sin 15^\circ} = 1.63 \text{ mi}$

$h = 1.63 \cdot \sin 40^\circ = 1.05 \text{ mi}$

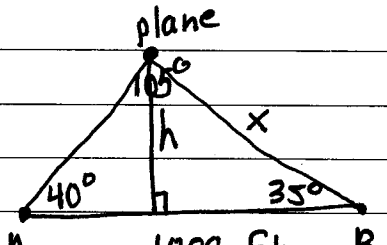
10. 

$180^\circ - 40^\circ - 65^\circ = 75^\circ$

$\frac{\sin 75^\circ}{50} = \frac{\sin 65^\circ}{x}$

$x = \frac{50 \sin 65^\circ}{\sin 75^\circ} = 46.9 \text{ km}$

11.



$180° - 40° - 35° = 105°$

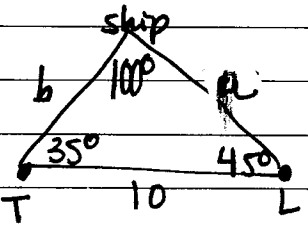
$\frac{\sin 105°}{1000} = \frac{\sin 40°}{x}$

$x = \frac{1000 \sin 40°}{\sin 105°} = 665.46$

$\sin 35° = \frac{h}{665.46}$

$h = 665.46 \sin 35° \approx 381.69$ ft

12.

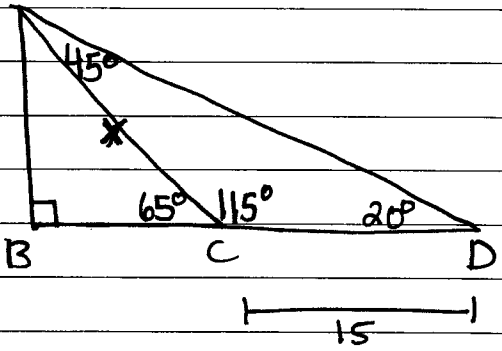


$\frac{\sin 100°}{10} = \frac{\sin 35°}{a}$ $\quad$ $\frac{\sin 100°}{10} = \frac{\sin 45°}{b}$

$a = \frac{10 \sin 35°}{\sin 100°} = 5.82$ $\quad$ $b = \frac{10 \sin 45°}{\sin 100°} = 7.18$

Lilly is 5.82 mi away
Tucker is 7.18 mi away

13.



$\frac{\sin 45°}{15} = \frac{\sin 20°}{x}$

$x = \frac{15 \sin 20°}{\sin 45°} = 7.26$

$\cos 65° = \frac{BC}{7.26}$

$BC = 7.26 \cos 65° = 3.07$