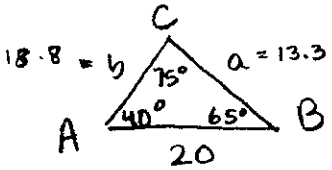
Precalculus
Law of Sines day 1 WS

Name Key
Period _____ Date _____

Solve the following triangles with the given information.

1. A = 40°, C = 75°, c = 20



$\frac{\sin 75°}{20} = \frac{\sin 40°}{a}$

$a = \frac{20 \sin 40°}{\sin 75°}$

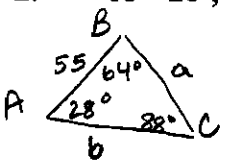
$a = 13.3$

$\frac{\sin 65°}{b} = \frac{\sin 75°}{20}$

$b = \frac{20 \sin 65°}{\sin 75°}$

$b = 18.8$

2. A = 28°, B = 64°, c = 55



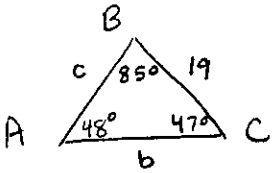
$\frac{\sin 88°}{55} = \frac{\sin 28°}{a}$

$a = \frac{55 \sin 28°}{\sin 88°}$ $a = 25.8$

$\frac{\sin 88°}{55} = \frac{\sin 64°}{b}$

$b = \frac{55 \sin 64°}{\sin 88°}$ $b = 49.5$

3. B = 85°, a = 19, C = 47°



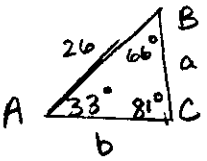
$\frac{\sin 48°}{19} = \frac{\sin 47°}{c}$

$c = \frac{19 \sin 47°}{\sin 48°} = 18.7$

$\frac{\sin 85°}{b} = \frac{\sin 48°}{19}$

$b = \frac{19 \sin 85°}{\sin 48°} = 25.5$

4. C = 81°, A = 33°, c = 26



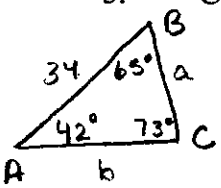
$\frac{\sin 81°}{26} = \frac{\sin 66°}{b}$

$b = \frac{26 \sin 66°}{\sin 81°} = 24.0$

$\frac{\sin 81°}{26} = \frac{\sin 33°}{a}$

$a = \frac{26 \sin 33°}{\sin 81°} = 14.3$

5. C = 73°, A = 42°, c = 34



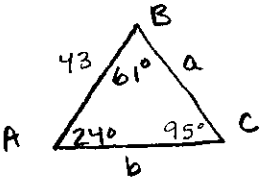
$\frac{\sin 73°}{34} = \frac{\sin 65°}{b}$

$b = \frac{34 \sin 65°}{\sin 73°} = 32.2$

$\frac{\sin 42°}{a} = \frac{\sin 73°}{34}$

$a = \frac{34 \sin 42°}{\sin 73°} = 23.8$

6. A = 24°, B = 61°, c = 43



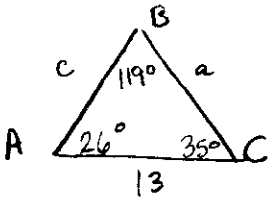
$\frac{\sin 95°}{43} = \frac{\sin 61°}{b}$

$b = \frac{43 \sin 61°}{\sin 95°} = 37.8$

$\frac{\sin 24°}{a} = \frac{\sin 95°}{43}$

$a = \frac{43 \sin 24°}{\sin 95°} = 17.6$

7. A = 26°, C = 35°, b = 13



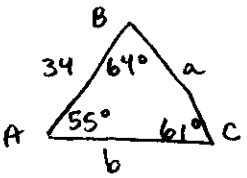
$\frac{\sin 119°}{13} = \frac{\sin 35°}{c}$

$c = \frac{13 \sin 35°}{\sin 119°} = 8.5$

$\frac{\sin 26°}{a} = \frac{\sin 119°}{13}$

$a = \frac{13 \sin 26°}{\sin 119°} = 6.5$

8. A = 55°, B = 64°, c = 34



$\frac{\sin 61°}{34} = \frac{\sin 55°}{a}$

$a = \frac{34 \sin 55°}{\sin 61°}$

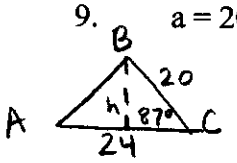
$a = 31.8$

$\frac{\sin 61°}{34} = \frac{\sin 64°}{b}$

$b = \frac{34 \sin 64°}{\sin 61°}$ $b = 34.9$

Find the area of the triangle with the given information.

9. $a = 20, b = 24, C = 87^\circ$

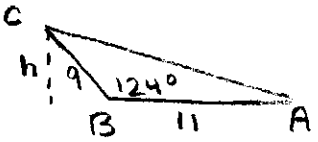


$\sin 87^\circ = \frac{h}{20}$ $\quad h = 20\sin 87^\circ$

$A = \frac{1}{2}(24)(20\sin 87)$

$A = 239.7$

10. $B = 124^\circ, a = 9, c = 11$

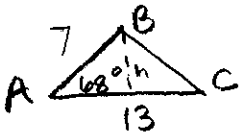


$\sin 56^\circ = \frac{h}{9}$ $\quad h = 9\sin 56^\circ$

$A = \frac{1}{2}(11)(9\sin 56^\circ)$

$A = 41.0$

11. $A = 68^\circ, b = 13, c = 7$

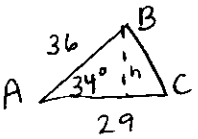


$\frac{h}{7} = \sin 68^\circ$ $\quad h = 7\sin 68^\circ$

$A = \frac{1}{2}(13)(7\sin 68^\circ)$

$A = 42.2^\circ$

12. $A = 34^\circ, b = 29, c = 36$



$\sin 34^\circ = \frac{h}{36}$ $\quad h = 36\sin 34^\circ$

$A = \frac{1}{2}(29)(36\sin 34^\circ)$

$A = 291.9$

13. Observers 2.32 mi apart see a hot-air balloon directly between them but at the angles of elevation shown in the figure. Find the altitude of the balloon.

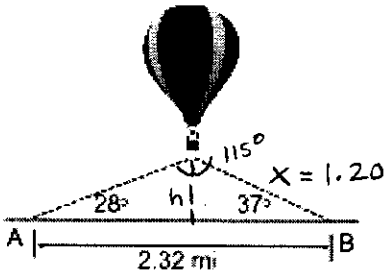
$\frac{\sin 28^\circ}{x} = \frac{\sin 115^\circ}{2.32}$

$x = \frac{2.32\sin 28^\circ}{\sin 115^\circ}$

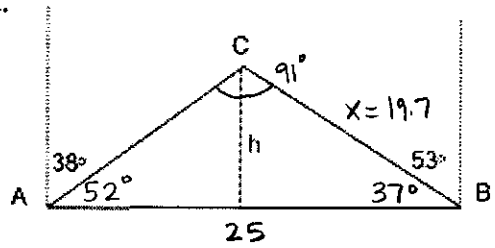
$\sin 37^\circ = \frac{h}{1.20}$

$h = 1.20\sin 37^\circ$

$h = .72$ mi



14. Two meteorologists are 25 mi apart located on an east-west road. The meteorologist at point A sights a tornado 38° east of north. The meteorologist at point B sights the same tornado 53° west of north. Find the distance from each meteorologist to the tornado. Also find the distance between the tornado and the road.



$\frac{\sin 52^\circ}{x} = \frac{\sin 91^\circ}{25}$

$x = \frac{25\sin 52^\circ}{\sin 91^\circ}$

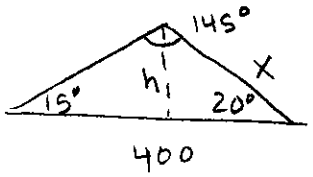
$x = 19.7$

$\sin 37^\circ = \frac{h}{19.7}$

$h = 19.7\sin 37^\circ$

$h = 11.9$ mi

15. Two observers are 400 ft apart on opposite sides of a tree. The angles of elevation from the observers to the top of the tree are 15° and 20°. Find the height of the tree.



$\frac{\sin 145^\circ}{400} = \frac{\sin 15^\circ}{x}$ $\quad x = 180.5$

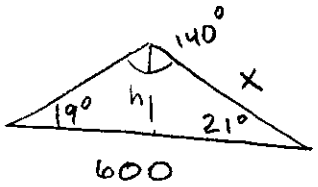
$x = \frac{400\sin 15^\circ}{\sin 145^\circ}$

$\sin 20^\circ = \frac{h}{180.5}$

$h = 180.5\sin 20^\circ$

$h = 61.7$

16. Two observers are 600 ft apart on opposite sides of a flagpole. The angles of elevation from the observers to the top of the pole are 19° and 21°. Find the height of the flagpole.



$\frac{\sin 140^\circ}{600} = \frac{\sin 19^\circ}{x}$

$x = \frac{600\sin 19^\circ}{\sin 140^\circ}$

$x = 303.9$ ft

$\sin 21^\circ = \frac{h}{303.9\text{ ft}}$

$h = 108.9$ ft