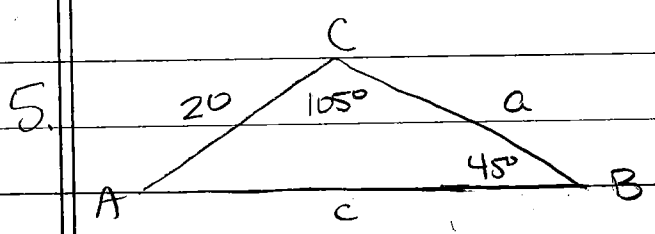


8.1 Law of Sines

pg 594 1-4, 5-41 EOO
45, 47, 55, 56

- 1. Oblique
- 2. $\frac{b}{\sin B}$

- 3) angles; side
- 4) $\frac{1}{2}ac \sin B$



$$A + 105^\circ + 45^\circ = 180$$

$$A + 150^\circ = 180^\circ$$

$$\boxed{A = 30^\circ}$$

$$\frac{a}{\sin 30^\circ} = \frac{20}{\sin 45^\circ}$$

$$a \sin 45^\circ = 20 \sin 30^\circ$$

$$\frac{\sin 45^\circ}{\sin 45^\circ} = \frac{20 \sin 30^\circ}{\sin 45^\circ}$$

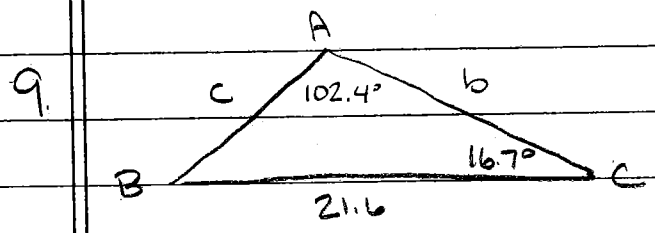
$$\boxed{a = 14.142}$$

$$\frac{c}{\sin 105^\circ} = \frac{20}{\sin 45^\circ}$$

$$c \sin 45^\circ = 20 \sin 105^\circ$$

$$\frac{\sin 45^\circ}{\sin 45^\circ} = \frac{20 \sin 105^\circ}{\sin 45^\circ}$$

$$\boxed{c = 27.321}$$



$$B + 102.4^\circ + 16.7^\circ = 180^\circ$$

$$B + 119.1^\circ = 180^\circ$$

$$\boxed{B = 60.9^\circ}$$

$$\frac{c}{\sin 16.7^\circ} = \frac{21.6}{\sin 102.4^\circ}$$

$$c \sin 102.4^\circ = 21.6 \sin 16.7^\circ$$

$$\frac{\sin 102.4^\circ}{\sin 102.4^\circ} = \frac{21.6 \sin 16.7^\circ}{\sin 102.4^\circ}$$

$$\boxed{c = 6.355}$$

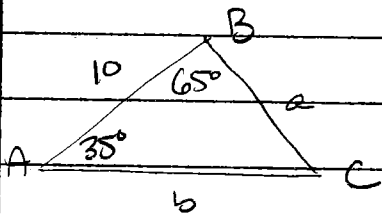
$$\frac{b}{\sin 60.9^\circ} = \frac{21.6}{\sin 102.4^\circ}$$

$$b \sin 102.4^\circ = 21.6 \sin 60.9^\circ$$

$$\frac{\sin 102.4^\circ}{\sin 102.4^\circ} = \frac{21.6 \sin 60.9^\circ}{\sin 102.4^\circ}$$

$$\boxed{b = 19.324}$$

13.



$$35 + 65 + C = 180$$

$$100 + C = 180$$

$$\boxed{C = 80^\circ}$$

$$\frac{10}{\sin 80} = \frac{a}{\sin 35} = \frac{b}{\sin 65}$$

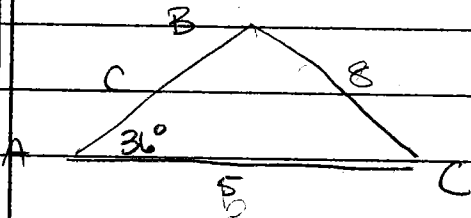
$$\frac{a \sin 80}{\sin 80} = \frac{10 \sin 35}{\sin 80}$$

$$\boxed{a = 5.824}$$

$$\frac{b \sin 80}{\sin 80} = \frac{10 \sin 65}{\sin 80}$$

$$\boxed{b = 9.203}$$

17.



$$36 + 21.553 + C = 180$$

$$56.553 + C = 180$$

$$\boxed{C = 122.447}$$

$$\frac{8}{\sin 36} = \frac{c}{\sin B}$$

$$\frac{8 \sin B}{8} = \frac{5 \sin 36}{8}$$

$$B = \sin^{-1} \left(\frac{5 \sin 36}{8} \right)$$

$$\boxed{B = 21.553^\circ}$$

$$\frac{c}{122.447} = \frac{8}{\sin 36}$$

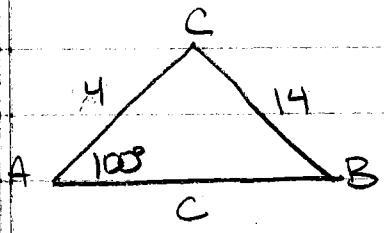
$$c \sin 36 = 8 \sin 122.447$$

$$\frac{c \sin 36}{\sin 36} = \frac{8 \sin 122.447}{\sin 36}$$

$$\boxed{c = 11.486}$$

8.1 Homework (cont'd)

21.



$$100 + 16.342 + C = 180$$

$$116.342 + C = 180$$

$$\boxed{C = 63.658^\circ}$$

$$\frac{14}{\sin 100} = \frac{4}{\sin B}$$

$$\frac{14 \sin B}{14} = \frac{4 \sin 100}{14}$$

$$\frac{c}{\sin 63.658} = \frac{14}{\sin 100}$$

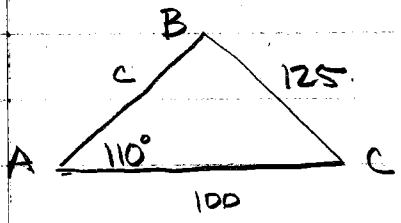
$$\frac{c \sin 100}{\sin 100} = \frac{14 \sin 63.658}{\sin 100}$$

$$B = \sin^{-1} \left(\frac{4 \sin 100}{14} \right)$$

$$\boxed{B = 16.342^\circ}$$

$$\boxed{C = 12.740^\circ}$$

25.



SSA → LA is obtuse → a > b
one solution

$$\frac{125}{\sin 110} = \frac{100}{\sin B}$$

$$\frac{125 \sin B}{125} = \frac{100 \sin 110}{125}$$

$$110 + 48.743 + C = 180$$

$$158.743 + C = 180$$

$$\boxed{C = 21.257^\circ}$$

$$B = \sin^{-1} \left(\frac{100 \sin 110}{125} \right)$$

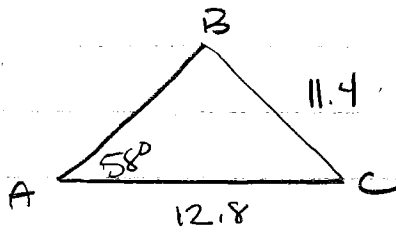
$$\boxed{B = 48.743^\circ}$$

$$\frac{125}{\sin 110} = \frac{c}{\sin 21.257}$$

$$\frac{c \sin 110}{\sin 110} = \frac{125 \sin 21.257}{\sin 110}$$

$$\boxed{C = 54.650^\circ}$$

29.



SSA \rightarrow $\angle A$ is acute $\rightarrow a < b \rightarrow$
 $a ? b \sin A$

$$b \sin A = 12.8 \sin 58$$

$$= 10.855$$

$a > b \sin A$ Two Solutions

Case I

$$\frac{11.4}{\sin 58} = \frac{12.8}{\sin B}$$

$$11.4 \sin B = 12.8 \sin 58$$

$$\frac{11.4}{11.4} = \frac{12.8 \sin 58}{11.4}$$

$$B = \sin^{-1} \left(\frac{12.8 \sin 58}{11.4} \right)$$

$$\boxed{B = 72.212^\circ}$$

$$58 + 72.212 + C = 180^\circ$$

$$130.212 + C = 180$$

$$\boxed{C = 49.788^\circ}$$

$$\frac{c}{\sin 49.788} = \frac{11.4}{\sin 58}$$

$$\frac{c \sin 58}{\sin 58} = \frac{11.4 \sin 49.788}{\sin 58}$$

$$\boxed{c = 21.866}$$

Case II

$$B' = 180 - 72.212$$

$$\boxed{B' = 107.788}$$

$$58 + 107.788 + C' = 180$$

$$165.788 + C' = 180$$

$$\boxed{C' = 14.212}$$

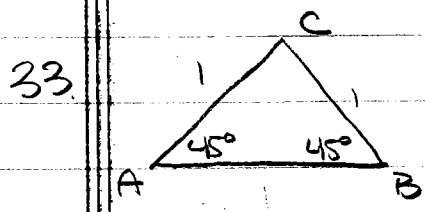
$$\frac{11.4}{\sin 58} = \frac{c}{\sin 14.212}$$

$$c \sin 58 = 11.4 \sin 14.212$$

$$\frac{c \sin 58}{\sin 58} = \frac{11.4 \sin 14.212}{\sin 58}$$

$$\boxed{c = 3.300}$$

8.1 Homework (cont'd)



If $a = b$, $A = B$
 $C = 90^\circ$ $B = 45^\circ$ $C = \sqrt{2}$

37. $A = 10^\circ$ $a = 10.8$

a) one solution

$$\boxed{b \leq 10.8}$$

or $\frac{10.8}{\sin 10} = \frac{b \sin 10^\circ}{\sin 10}$

$$\boxed{\frac{10.8}{\sin 10} = b}$$

b) two solutions

$b > 10.8$ and $\frac{10.8}{\sin 10} > \frac{b \sin 10^\circ}{\sin 10}$
 $62.195 > b$

$$\boxed{10.8 < b < 62.195}$$

c) no solutions

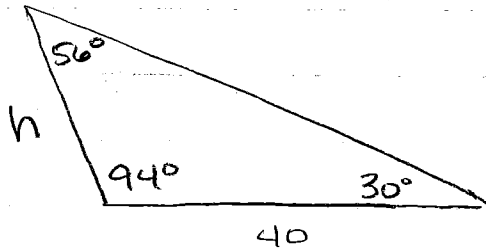
$b > 10.8$

$\frac{10.8}{\sin 10} < \frac{b \sin 10^\circ}{\sin 10}$

$$\boxed{62.195 < b}$$

41. $A = \frac{1}{2} (57)(85) \sin(43^\circ 45')$
 $= \boxed{1675.190 \text{ u}^2}$

45.



$$94 + 30 + x = 180$$

$$124 + x = 180$$

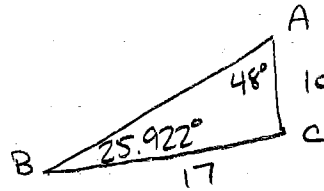
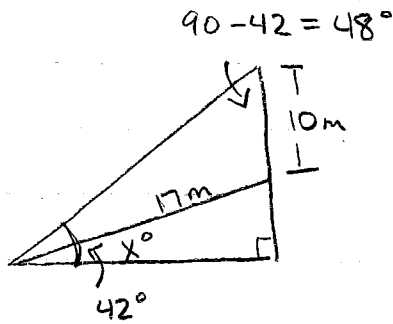
$$x = 56^\circ$$

$$\frac{h}{\sin 30} = \frac{40}{\sin 56}$$

$$h \sin 56 = \frac{40 \sin 30}{\sin 56}$$

$$h = 24.124 \text{ m}$$

47.



$$\frac{17}{\sin 48} = \frac{10}{\sin B}$$

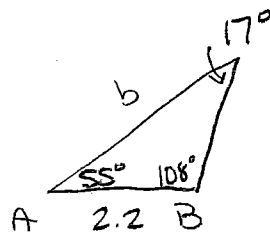
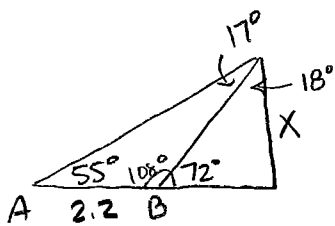
$$\frac{17 \sin B}{17} = \frac{10 \sin 48}{17}$$

$$B = \sin^{-1} \left(\frac{10 \sin 48}{17} \right)$$

$$B = 25.922^\circ$$

$$\theta = 42 - 25.922 = 16.078^\circ$$

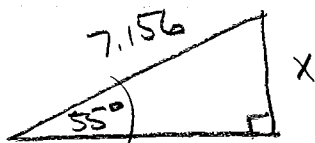
55.



$$\frac{2.2}{\sin 17} = \frac{b}{\sin 108}$$

$$\frac{b \sin 17}{\sin 17} = \frac{2.2 \sin 108}{\sin 17}$$

$$b = 7.156$$



$$7.156 \cdot \sin 55 = \frac{x}{7.156}$$

$$x = 5.862 \text{ mi}$$