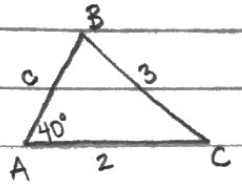
3.5 Oblique Triangles Review

1. 

SSA → Ambiguous Case?

$\frac{\sin B}{2} = \frac{\sin 40}{3}$

$\sin B = \frac{2\sin 40}{3}$

$B = \sin^{-1}\left(\frac{2\sin 40}{3}\right)$

$\boxed{B = 25.37°}$ option #1

Option #2 $m\angle B = 180 - 25.37$

$m\angle B = 154.63°$

If $m\angle B = 154.63°$,

$m\angle C = 180 - 40 - 154.63° =$

$m\angle C = -14.63°$ * not possible

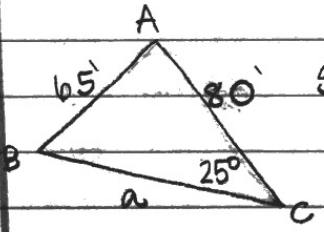
∴ only one triangle exists!

If $B = 25.37$, $c = 180 - 25.37 - 40 = \boxed{114.63°}$

$\frac{c}{\sin 114\,63} = \frac{3}{\sin 40}$, $c = \frac{3\sin 114}{\sin 40}$

$\boxed{c = 4.26}$

$\boxed{\begin{array}{l} B = 25.37° \\ C = 114.63° \\ c = 4.26 \end{array}}$

2. 

SSA → ambiguous case?

$\frac{\sin B}{80} = \frac{\sin 25}{65}$

$B = \sin^{-1}\left(\frac{80\sin 25}{65}\right)$

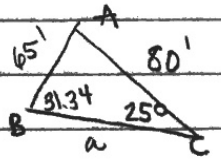
$\boxed{B = 31.34°}$ option #1

Option #2: $m\angle B = 180 - 31.34 = 148.66$.

If $m\angle B = 148.66°$,

$m\angle A = 180 - 148.66 - 25 = 6.34°$

∴ there are 2 possible triangles!

Option 1 

$A = 180 - 31.34 - 25 = \boxed{123.66°}$

$\frac{a}{\sin 123.66} = \frac{25}{\sin 65}$

$a = \frac{25\sin 123.66}{\sin 65}$

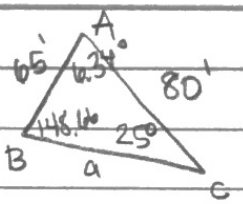
$a = \boxed{11.07}$

$\boxed{\begin{array}{l} a = 11.07 \\ A = 123.66° \\ B = 31.34° \end{array}}$

OR →

continue →

Option 2



$\frac{a}{\sin 6.34} = \frac{65}{\sin 25}$

$a = \frac{65 \sin 6.34}{\sin 25}$

$a = 3.05$

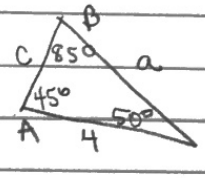
$a = 3.05$
$A = 6.34°$
$B = 148.66°$

conclusion:

In option #1, the largest angle would be $A = 123.66°$.

In option #2, the largest angle would be $B = 148.66°$.

3.



① $m\angle B = 180 - 45 - 50 = 85°$

$\boxed{m\angle B = 85°}$

$B = 85°$
$a = 2.84$
$c = 3.08$

② $\frac{a}{\sin 45} = \frac{4}{\sin 85}$

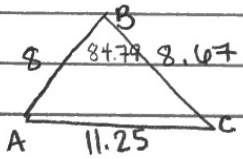
$a = \frac{4 \sin 45}{\sin 85} = \boxed{2.84}$

③ $\frac{c}{\sin 50} = \frac{4}{\sin 85}$

$c = \frac{4 \sin 50}{\sin 85} = \boxed{3.08}$

4. omit

5.



* Law of Cosines → find largest angle 1st!

① $11.25^2 = 8^2 + 8.67^2 - 2 \cdot 8 \cdot 8.67 \cos B$

$126.5625 = 139.1689 - 138.72 \cos B$

$-12.60064 = -138.72 \cos B$

$\frac{-12.60064}{-138.72} = \cos B$

$B = \cos^{-1}\left(\frac{12.60064}{138.72}\right)$

$B = 84.79°$

② use LOS to find smallest ∠

$\frac{\sin C}{8} = \frac{\sin 84.79}{11.25}$

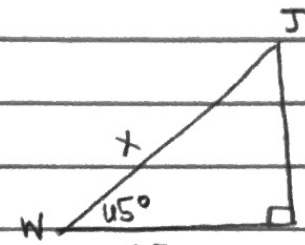
$\sin C = \frac{8 \sin 84.79}{11.25}$

$C = \sin^{-1}\left(\frac{8 \sin 84.79}{11.25}\right)$

$C = \boxed{45.09°}$

y must be smallest angle!

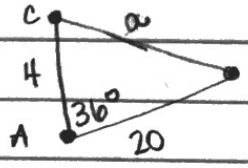
6.



$\cos 65° = \frac{25}{X}$

$X = \frac{25}{\cos 65} = \boxed{59.16 \text{ ft}}$

7.



$a^2 = 4^2 + 20^2 - 2 \cdot 20 \cdot 4 \cos 36$

$a = \boxed{16.93 \text{ ft}}$

The clownfish is about to become sushi!

8. omit

9. omit

10. omit

11. $\sin x = 4/7$

$\cos x = -\sqrt{33}/7$

$\cot x = \frac{\cos x}{\sin x} = \frac{-\sqrt{33}/7}{4/7} = \frac{-\sqrt{33}}{7} \cdot \frac{7}{4} = \boxed{\frac{-\sqrt{33}}{4}}$

12. $\frac{\sec^2 x}{\cot x} - \tan^3 x = \tan x$

$= \frac{(\tan^2 x + 1)}{\cot x} - \tan^3 x$

$= \frac{\tan^2 x}{\cot x} + \frac{1}{\cot x} - \tan^3 x$

$= \tan^2 x \cdot \tan x + \tan x - \tan^3 x$

$= \tan^3 x + \tan x - \tan^3 x$

$= \boxed{\tan x}$

13. $2\cos x - \sqrt{3} = 0$

$\cos x = \sqrt{3}/2$

$\boxed{x = \pi/6, 11\pi/6}$

14. $\cos^2 x - \cos 2x = 0$

$\cos^2 x - (\cos^2 x - \sin^2 x) = 0$

$\cos^2 x - \cos^2 x + \sin^2 x = 0$

$\sin^2 x = 0$

$\sin x = 0$

$\boxed{x = 0, \pi, 2\pi}$

15. $\sin 255 = \sin(210+45)$

$\sin(210)\cos(45) + \cos(210)\sin(45)$

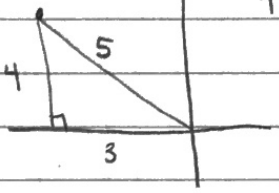
$\left(-\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(-\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$

$\frac{-\sqrt{2}}{4} + \frac{-\sqrt{6}}{4} = \boxed{\frac{-\sqrt{2}-\sqrt{6}}{4}}$

16. $\frac{\tan 97 - \tan 37}{1 + (\tan 97)(\tan 37)} = \tan(97-37) = \tan 60^\circ = \boxed{\sqrt{3}}$

17. $\cos\theta = 3/4$

$\sin\theta < 0$



$\tan 2\theta =$

18. a. $\sin^{-1}\left(-\sqrt{2}/2\right) = \boxed{-\pi/4}$

b. $\tan^{-1}(0) = \boxed{0}$

c. $\arccos(\sin \pi/3)$

$\arccos(\sqrt{3}/2)$

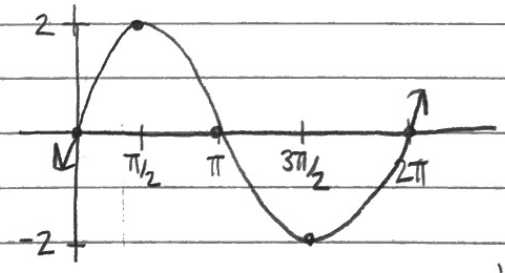
$\boxed{\pi/6}$

19. $y = 2\sin x$

amplitude = 2

period = 2π

key values = $\pi/2$



20. $y = \tan x - 3$

no amplitude

period: π

shift down 3

key vals: $\pi/4$