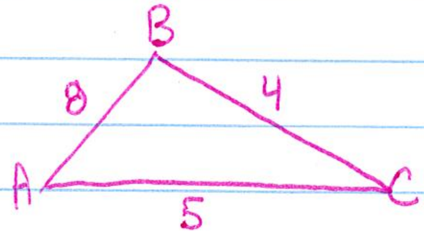
Pre-Calculus Unit 3 Review Answers. *Pictures not drawn to scale! *

1.



$4^2 = 5^2 + 8^2 - 2(5)(8)\cos A$

$16 = 89 - 80\cos A$

$-73 = -80\cos A$

$0.9125 = \cos A$

$\cos^{-1}(0.9125) = 24.15°$

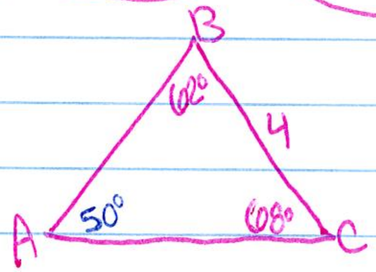
$\frac{\sin 24.15°}{4} = \frac{\sin B}{5}$

$\sin B = 0.5114$

$B = 30.76°$

* Because 8 is longest side, there is a chance ∠C will be obtuse. Neither one of other 2 angles could be obtuse. Find those 2 first. Using law of Sines to find ∠C will yield 54.91° which is illogical! (Doesn't add up to 180° with other 2). Instead, subtract ∠A and ∠B from 180°. You get the supplement of 54.91°. Or, use Law of Cosines again!

2.



$\angle A = 180 - 62° - 68 = 50°$

$\frac{\sin 50°}{4} = \frac{\sin 62°}{b}$

$b = 4.61$

$\frac{\sin 50°}{4} = \frac{\sin 68°}{c}$

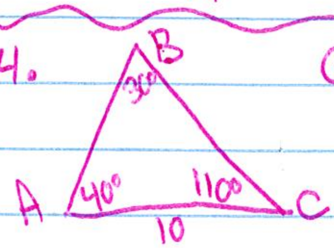
$c = 4.84$

3.

Given: SSA! Ew! Ambiguous! → $h = \sin 88° \cdot 62 = 61.96$

$14 < h$! No Δ! Yay!

4.



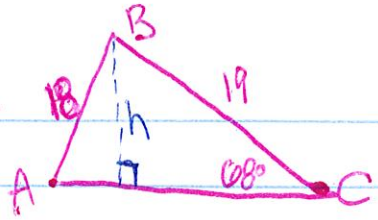
Given: AAS! Yay! Easiest!

$\angle C = 180 - 30 - 40 = 110°$

$\frac{\sin 30°}{10} = \frac{\sin 40°}{a} = \frac{\sin 110°}{c}$

$a = 12.86$ $c = 18.79$

5.



Given: SSA! Ew! Ambiguous!

$h = 19 \cdot \sin 68° = 17.62$

$18 > h$, super ew!!

$\Delta 1$: $\dfrac{\sin 68°}{18} = \dfrac{\sin A}{19}$

$\angle A = 78.15°$

$\angle B = 180 - 78.15 - 68 = 33.85°$

$\dfrac{\sin 68°}{18} = \dfrac{\sin 33.85°}{b}$

$b = 10.81$

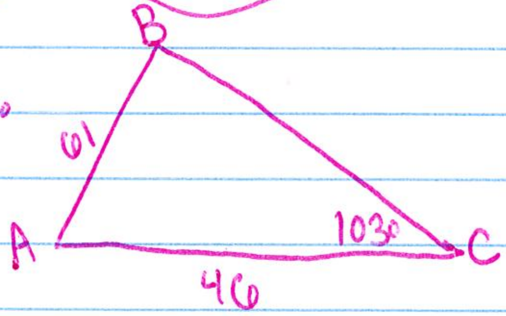
$\Delta 2$: $\angle A = 180 - 78.15 = 101.85°$

$\angle B = 180 - 101.85 - 68 = 10.15°$

$\dfrac{\sin 68}{18} = \dfrac{\sin 10.15°}{b}$

$b = 3.42$

6.



Given: SSA! Ew! BUT... obtuse angle given! Yay!

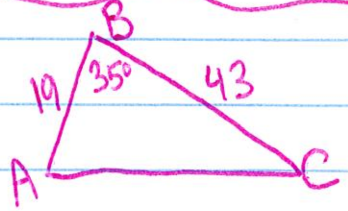
$\dfrac{\sin 103°}{61} = \dfrac{\sin B}{46}$

$\angle B = 47.29°$

$\angle A = 180 - 103 - 47.29 = 29.71°$

$\dfrac{\sin 103}{61} = \dfrac{\sin 29.71°}{a}$ $\quad a = 31.03$

7.



Given: SAS! Yay!

$b^2 = 19^2 + 43^2 - 2(19)(43)\cos 35°$

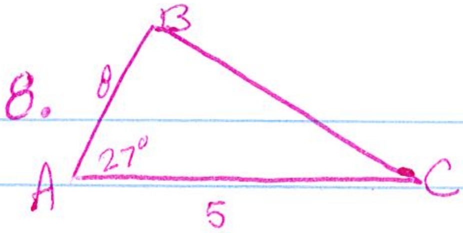
$\boxed{b = 29.52}$

$\dfrac{\sin 35}{29.52} = \dfrac{\sin C}{19}$ $\quad \boxed{\angle C = 21.66°}$

$\angle A = 180 - 21.66 - 35 = 123.34°$

* Angle A could be obtuse (across from longest side). Find $\angle C$ 1st!! *

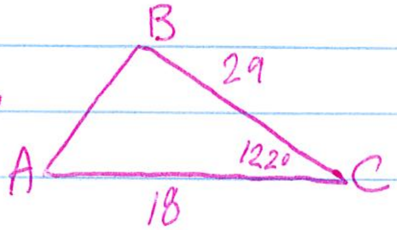
8.



$A = \frac{1}{2}(8)(5)\sin 27°$

$= 9.08$

9.



$A = \frac{1}{2}(18)(29)\sin 122°$

$= 221.34$

10. $s = \frac{1}{2}(4+5+7) = 8$

$A = \sqrt{8(4)(3)(1)} = \sqrt{96} = 4\sqrt{6}$ or 9.8

11. $s = \frac{1}{2}(64.8 + 49.2 + 24.1) = 69.05$

$A = \sqrt{69.05(4.25)(19.85)(44.95)} = 511.71$

12a) $\frac{\sin 20°}{60} = \frac{\sin ?}{100}$ $? = 34.75°$ or $145.25°$

Hinge $\angle = 125.25°$ or $14.75°$

if Hinge $= 125.25°$, $\frac{\sin 20}{60} = \frac{\sin 125.25}{\text{horizon}}$, horizontal distance = 143.26 cm

if Hinge $= 14.75°$, $\frac{\sin 20°}{60} = \frac{\sin 14.75°}{\text{horizon}}$, horizontal distance = 44.66 cm

12b) if $\theta = 50$, $h = 100 \cdot \sin 50 = 76.6$ cm

$60\text{cm} < h \quad \therefore$ no Δ.

12c) if $h = 60$, right Δ: $60 = 100\sin\theta$

$.6 = \sin\theta$

$\theta = 36.87°$

13a) largest $\angle$ is across 257m: $257^2 = 114^2 + 165^2 - 2(114)(165)\cos\theta$

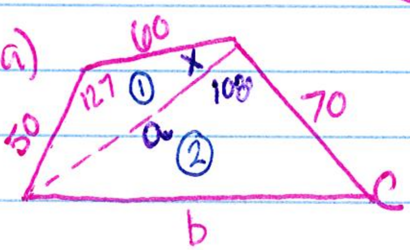
$25{,}828 = -37{,}620\cos\theta$

$-0.6865497 = \cos\theta$

$\theta = 133.36°$

13b) $s = \frac{1}{2}(114 + 165 + 257) = 268$ $\quad A = \sqrt{268(154)(103)(11)} = 6838.21\ m^2$

14.a)



① $A = \frac{1}{2}(50)(60)\sin 127° = 1197.95\ m^2$

$+$

② $A = \frac{1}{2}(70)(98.54)\sin 108 = 3280.1$

$\approx 4478\ m^2$

$a^2 = 50^2 + 60^2 - 2(50)(60)\cos 127°$

$a = 98.54$

$\frac{\sin 127}{98.54} = \frac{\sin x}{50}$ $\quad x = 23.91° \approx 24°$ $\quad 132 - 23.91 \approx 108°$

14c) $\frac{\sin 108}{137.38} = \frac{\sin C}{98.54}$ $\quad C = 43°$

14b) $b^2 = 98.54^2 + 70^2 - 2(98.54)(70)\cos 108$

$= 137.38$

$360° - 43° - 132° - 127° = 58°$