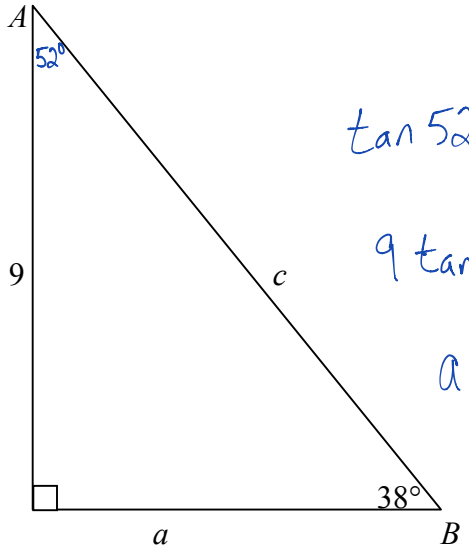
Math Analysis Worksheet **Name** Solutions

Applying Trig Functions, Law of Sines, & Law of Cosines

Show all your work

1) Find the missing sides and angles



$A = 52$ $a \approx 11.519$ $c \approx 14.618$

$\tan 52 = \frac{a}{9}$

$9 \tan 52 = a$

$a \approx 11.519$

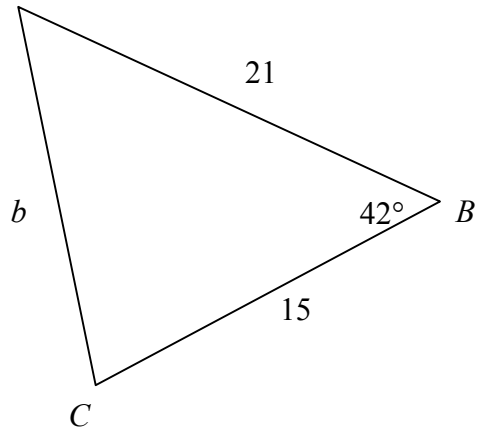
$\sin 38 = \frac{9}{c}$

$\frac{c}{9} = \frac{1}{\sin 38}$

$c = \frac{9}{\sin 38}$

≈ 14.618

2)



$A = 45.530°$ $C = 92.70°$ $b = 14.065$

$b^2 = 21^2 + 15^2 - 2(21)(15)\cos 42$

$b = 14.065$

$\frac{\sin A}{15} = \frac{\sin B}{b}$

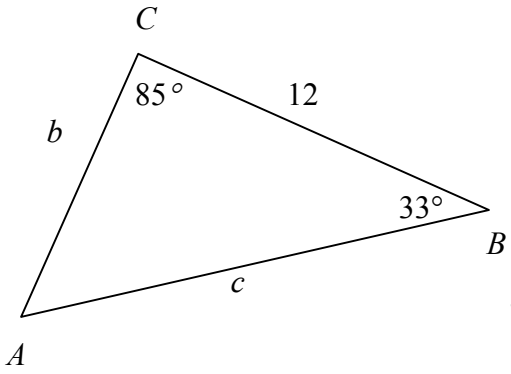
$\frac{b \sin A}{b} = \frac{15 \sin 42}{b}$

$\sin A = \frac{15 \sin 42}{b}$

$A = \sin^{-1}\left(\frac{15 \sin 42}{b}\right)$

$A = 45.530°$

3)



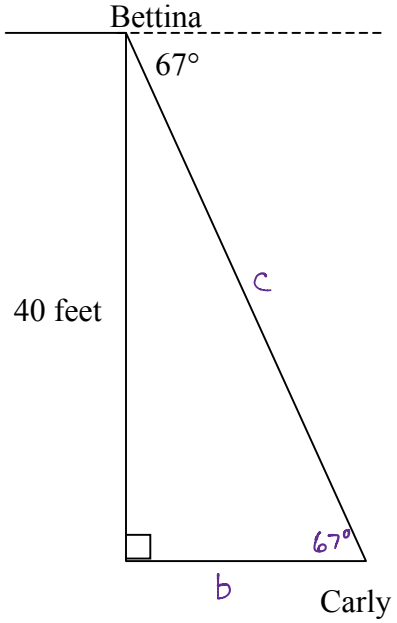
$A = 62°$ $b =$ $c =$

$\frac{\sin 62}{12} = \frac{\sin 85}{c} = \frac{\sin 33}{b}$

$c = \frac{12 \sin 85}{\sin 62}$ $b = \frac{12 \sin 33}{\sin 62} \approx 7.402$

≈ 13.539

4) While Carly is sitting in the Piazza drinking a 5 hour energy drink to help her focus, Bettina is preparing to loft a water balloon from the roof of the building at her. If the angle of depression from Bettina to Carly is 67° and the roof is 40 feet high(see diagram below),



a) How far is Bettina from Carly?

$\sin 67 = \frac{40}{c}$

$\frac{1}{\sin 67} = \frac{c}{40}$

$c = \frac{40}{\sin 67}$

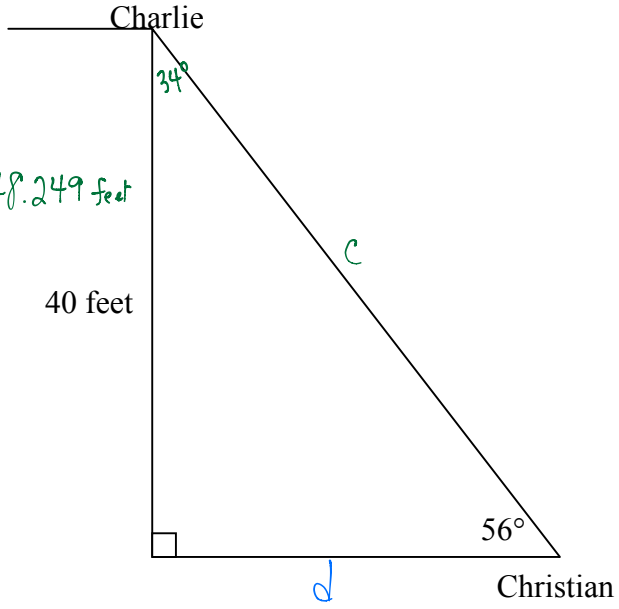
$c \approx 43.454$ feet

b) How far is Carly sitting from the school building?

$\tan 23 = \frac{b}{40}$

$40 \tan 23 = b \approx 16.979$ feet

5) What Charlie doesn't know is that Christian is hiding around the corner with a Super Soaker ready to nail him when he steps out to the edge of the roof. Angelina stops and measures the angle of elevation from him to Charlie and finds that it is 56°.



a) How far is Christian from Charlie?

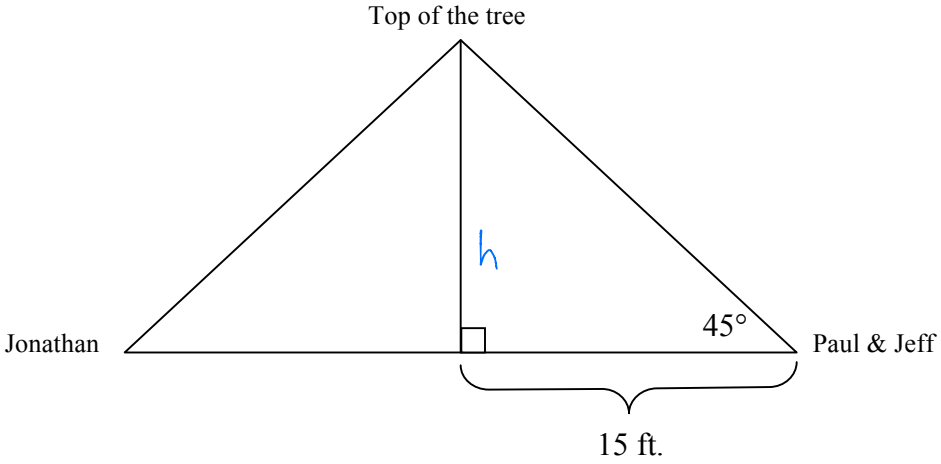
$\sin 56 = \frac{40}{c} \Rightarrow \frac{1}{\sin 56} = \frac{c}{40} \Rightarrow c = \frac{40}{\sin 56} \approx 48.249$ feet

b) How far is Christian from the school building?

$\tan 34 = \frac{d}{40}$

$d = 40 \tan 34 \approx 26.98$ ft

6) Paul and Jeff are across the Piazza with paint guns ready to nail Jonathan who is napping on a bench. While they are using one of the trees as cover, they realize that they have to aim above the tree. They determine the angle of elevation from them to the top of the tree to be 45° and that they are 15 feet from the tree.



a) How far are they from Jonathan?

30 ft (Isosceles triangle)

b) How high is the tree?

$\tan 45 = \frac{h}{15} \Rightarrow 1 = \frac{h}{15} \Rightarrow h = 15$ feet