

Write your questions and thoughts here!

12.1 Law of Sines

APPLICATION 12.1

4

1. Solve $\triangle ABC$ if $b = 15$, $c = 13$ and $C = 50^\circ$

Solution 1

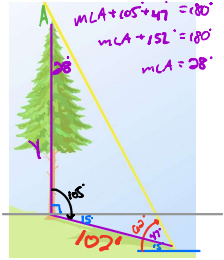
ASS: $\frac{\sin 50^\circ}{13} = \frac{\sin B}{15}$
 $\frac{15 \sin 50^\circ}{13} = \sin B$
 $\sin^{-1}\left(\frac{15 \sin 50^\circ}{13}\right) = B$
 $62.1^\circ \approx B$

$62.1^\circ + 50^\circ + m\angle A = 180^\circ$
 $112.1^\circ + m\angle A = 180^\circ$
 $m\angle A = 67.9^\circ$

2 Solution?

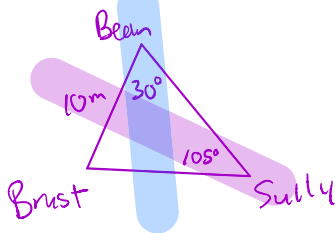
2. A tree growing on the side of a hill casts a 102-foot shadow straight down the hill (see figure). Find the vertical height of the tree if, relative to the horizontal, the hill slopes 15° and the angle of elevation of the sun is 62° .

$\frac{\sin 28^\circ}{102} = \frac{\sin 47^\circ}{y}$
 $y \sin 28^\circ = 102 \sin 47^\circ$
 $y = \frac{102 \sin 47^\circ}{\sin 28^\circ}$
 $y \approx 158.90$



The tree is about 158.90 feet tall.

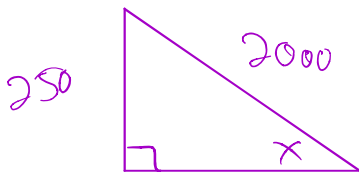
3. 3 Algebras are camping in the woods: Bean, Brust and Sully. They each have their own tent and the tents are set up in a triangle. Bean and Brust are 10m apart. The angle formed at Bean is 30° . The angle formed at Sully is 105° . How far apart are Brust and Sully?



$\frac{\sin 105^\circ}{10} = \frac{\sin 30^\circ}{b}$
 $b \sin 105^\circ = 10 \sin 30^\circ$
 $b = \frac{10 \sin 30^\circ}{\sin 105^\circ}$
 $b \approx 5.18$

Brust and Sully are 5.18 feet apart.

4. In order to reach the top of a hill that is 250 feet high, one must travel 2000 feet up a road that leads to the top. Find the number of degrees contained in the angle that the road makes with the horizontal.



$\sin X = \frac{250}{2000}$
 $X = \sin^{-1}\left(\frac{250}{2000}\right)$
 $X \approx 7.18^\circ$

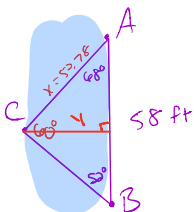
The road makes a 7.18° angle with the ground.

5. Two markers A and B are on the same side of a river are 58 feet apart. A third marker is located across the river at point C. A surveyor determines that $\angle CAB = 68^\circ$ and $\angle ABC = 52^\circ$.

a) What is the distance between points A and C?

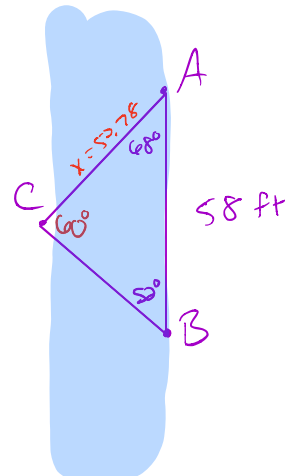
$\frac{\sin 60^\circ}{58} = \frac{\sin 52^\circ}{x}$
 $x \sin 60^\circ = 58 \sin 52^\circ$
 $x = \frac{58 \sin 52^\circ}{\sin 60^\circ}$
 $x \approx 52.78$
 The distance between A and C is 52.78 feet

b) What is the distance across the river?



$\sin 68^\circ = \frac{y}{52.78}$
 $52.78 \sin 68^\circ = y$
 $48.94 \approx y$

The distance across the river is 48.94 feet.



$68^\circ + 52^\circ + m\angle C = 180^\circ$
 $120^\circ + m\angle C = 180^\circ$
 $m\angle C = 60^\circ$