

SOML MEET IV
EVENT I
APPLICATIONS OF TRIGONOMETRY

NAME: _____
TEAM: _____
SCHOOL: _____

1. [2 Points] A 40 ft. ladder leans against a building. If the base of the ladder is 6 ft. from the base of the building, what is the angle in degrees formed by the ladder and the building? (Answer correct to one decimal place)

ANS:

2. [3 Points] To find the distance across a river, a surveyor chooses points A and B, which are 200 ft apart on one side of the river (see figure). She then chooses a reference point C on the opposite side of the river and finds that $\angle BAC = 82^\circ$ and $\angle ABC = 52^\circ$. Approximate the distance from A to C. (approximate the value to the nearest foot.)

ANS:

3. [5 Points] A steep mountain is inclined 74° to the horizontal and rises 3400 ft above the surrounding plain. A cable car is to be installed from a point 800 ft from the base to the top of the mountain, as shown. Find the shortest length of cable needed. (approximate the value to the nearest foot)

ANS:

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1. [2 Points] A 40 ft. ladder leans against a building. If the base of the ladder is 6 ft. from the base of the building, what is the angle in degrees formed by the ladder and the building? (Answer correct to one decimal place)

Solution:

If θ is the angle between the ladder and the building, then $\sin \theta = \frac{6}{40} = 0.15$.

So θ is the angle whose sine is 0.15. To find the angle θ , we use a calculator and use the \sin^{-1} key. With our calculator in degree mode, we get $\theta \approx 8.6^\circ$

ANS: $\theta \approx 8.6^\circ$

2. [3 Points] To find the distance across a river, a surveyor chooses points A and B, which are 200 ft apart on one side of the river (see figure). She then chooses a reference point C on the opposite side of the river and finds that $\angle BAC = 82^\circ$ and $\angle ABC = 52^\circ$. Approximate the distance from A to C. (approximate the value to the nearest foot.)

Solution:

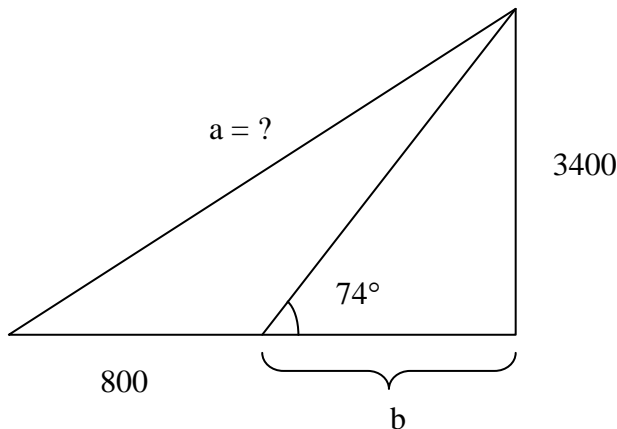
$\angle ACB = 180^\circ - 82^\circ - 52^\circ = 46^\circ$ By the Law of Sines, $\frac{\sin(46^\circ)}{200} = \frac{\sin(52^\circ)}{AC}$.

Thus, $AC = \frac{200 \cdot \sin(52^\circ)}{\sin(46^\circ)} \approx 219$ feet (answer given to the nearest foot)

ANS: 219 feet

3. [5 Points] A steep mountain is inclined 74° to the horizontal and rises 3400 ft above the surrounding plain. A cable car is to be installed from a point 800 ft from the base to the top of the mountain, as shown. Find the shortest length of cable needed. (Approximate the value to the nearest foot)

Solution:



$$\tan 74^\circ = \frac{3400}{b}$$

$$b = \frac{3400}{\tan 74^\circ} \approx 974.93$$

$$a^2 = 3400^2 + (800 + b)^2$$

$$a \approx \sqrt{(3400)^2 + (800 + 974.93)^2}$$

$$a \approx 3835 \text{ ft}$$

ANS: $\approx 3835 \text{ ft}$