

SOML MEET 4
EVENT 1
Applications of Trigonometry

NAME: _____
TEAM: _____
SCHOOL: _____

1. [2 Points] A 21-ft ladder leans against a building so that the angle between the ground and the ladder is 68° . How high does the ladder reach on the building? Please round your answer to the nearest foot.

ANS: _____ **ft**

2. [3 Points] An observer is standing directly underneath a hot air balloon that is anchored to the ground with 770-ft of rope (assume no sag!). If the observer is 500 feet from the anchor, what is the measure of the angle (to the nearest tenth of a degree) that the rope makes with the ground?

ANS: _____ **degrees**

3. [5 Points] A surveyor standing some (unknown) distance from a mountain takes an angle elevation of the top of the mountain and sees that it is at 30° . She walks 100 meters towards the mountain and takes another angle of elevation and sees that the top of the mountain is now at 45° . Find an EXACT value for the height of the mountain.

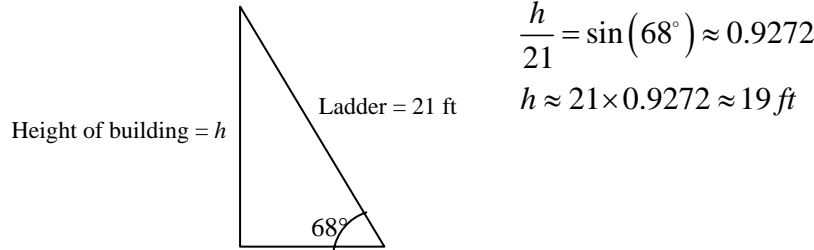
ANS: _____ **meters**

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NAME: KEY
TEAM: _____
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1. [2 Points] A 21-ft ladder leans against a building so that the angle between the ground and the ladder is 68° . How high does the ladder reach on the building? Please round your answer to the nearest foot.

Solution:



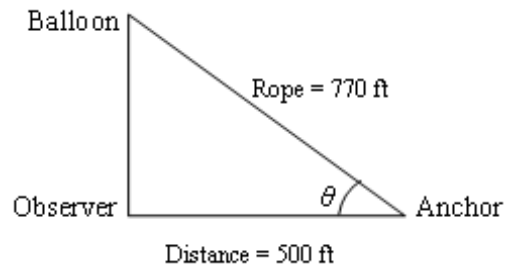
$$\frac{h}{21} = \sin(68^\circ) \approx 0.9272$$

$$h \approx 21 \times 0.9272 \approx 19 \text{ ft}$$

ANS: 19 ft

2. [3 Points] An observer is standing directly underneath a hot air balloon that is anchored to the ground with 770-ft of rope (assume no sag!). If the observer is 500 feet from the anchor, what is the measure of the angle (to the nearest tenth of a degree) that the rope makes with the ground?

Solution: $\cos(\theta) = \frac{500}{770} \approx 0.6494$
 $\theta \approx \cos^{-1}(0.6494) \approx 49.5^\circ$

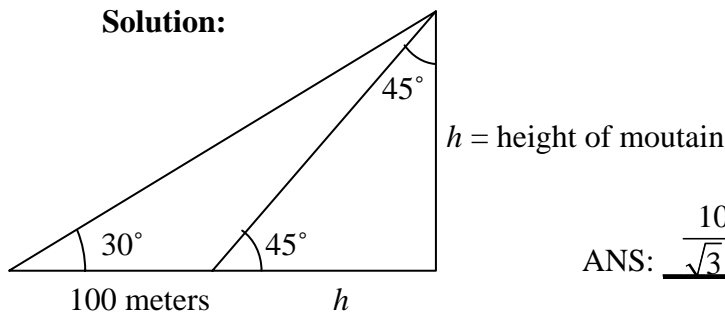


ANS: 49.5 degrees

3. [5 Points] A surveyor standing some (unknown) distance from a mountain takes an angle elevation of the top of the mountain and sees that it is at 30° . She walks 100 meters towards the mountain and takes another angle of elevation and sees that the top of the mountain is now at 45° . Find an EXACT value for the height of the mountain.

$$\tan(30^\circ) = \frac{1}{\sqrt{3}} = \frac{h}{h+100}$$

Solution:



$$h+100 = \sqrt{3} h$$

$$100 = (\sqrt{3} - 1)h$$

$$\frac{100}{\sqrt{3} - 1} = h$$

ANS: $\frac{100}{\sqrt{3}-1}$ meters