

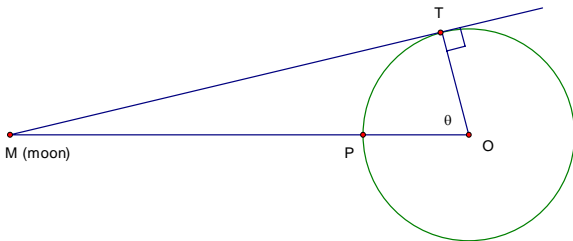
**SOML MEET 4**  
**EVENT 1**  
**Applications of Trigonometry**

**NAME:** \_\_\_\_\_  
**TEAM:** \_\_\_\_\_  
**SCHOOL:** \_\_\_\_\_

1. [2 Points] The highest tower in the world is the CN Tower in Toronto, Canada. From a distance of 2km from its base, the angle elevation to the top of the tower is  $28.81^\circ$ . Find the height of the tower. Round off your answer to the nearest tenth of a kilometer.

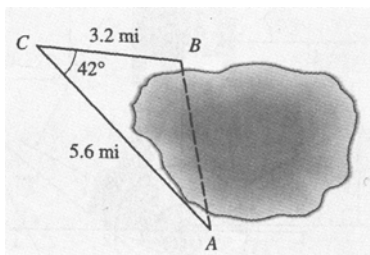
ANS: \_\_\_\_\_

2. [3 Points] At point  $P$  on the earth's surface, the moon is observed to be directly overhead, while at the same time at point  $T$ , the moon is just visible. See the figure. Use a calculator and the following data to estimate the distance  $MP$  from the earth to the moon:  $\theta = 89.05^\circ$  and  $OT = OP = 4000$  miles. Round off your answer to the nearest thousand miles.



ANS: \_\_\_\_\_

3. [5 Points] Find the distance between points A and B on opposite sides of a lake from the information shown. Round off your answer to the nearest tenth of a mile.



ANS: \_\_\_\_\_

**SOML MEET 4**  
**EVENT 1**  
**Applications of Trigonometry**

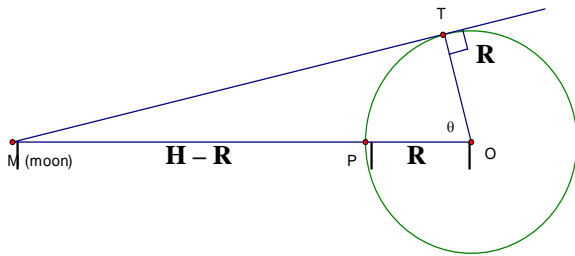
**NAME:** KEY  
**TEAM:** \_\_\_\_\_  
**SCHOOL:** \_\_\_\_\_

1. [2 Points] The highest tower in the world is the CN Tower in Toronto, Canada. From a distance of 2km from its base, the angle elevation to the top of the tower is  $28.81^\circ$ . Find the height of the tower. Round off your answer to the nearest tenth of a kilometer.

**Solution:** height =  $2 \cdot \tan(28.81^\circ) = 2(0.54998) = 1.09996 \approx 1.1$

ANS: 1.1 km

2. [3 Points] At point  $P$  on the earth's surface, the moon is observed to be directly overhead, while at the same time at point  $T$ , the moon is just visible. See the figure. Use a calculator and the following data to estimate the distance  $MP$  from the earth to the moon:  $\theta = 89.05^\circ$  and  $OT = OP = 4000$  miles. Round off your answer to the nearest thousand miles.



**Solution:** Since  $\frac{R}{H} = \cos \theta$

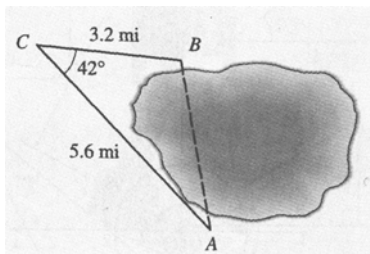
$$\text{and } \frac{R}{\cos \theta} = H$$

$$\text{then } H - R = \frac{R}{\cos \theta} - R.$$

$$\frac{4000}{\cos 89.05} - 4000 \approx 237,256$$

ANS: 237,000 miles

3. [5 Points] Find the distance between points A and B on opposite sides of a lake from the information shown. Round off your answer to the nearest tenth of a mile.



**Solution:** We can find a using the Law of Cosines.

$$c^2 = b^2 + a^2 - 2ba \cos C$$

$$= 5.6^2 + 3.2^2 - 2(5.6)(3.2)(\cos 42^\circ)$$

$$\approx 14.97$$

$$\text{So } c \approx \sqrt{14.97} \approx 3.868551$$

ANS: 3.9 miles