

Name: _____ Date: _____

Finding Missing Sides in Right Triangles

When we are trying to find a **side** we use sine, cosine, and tangent.

SOH-CAH-TOA

Remember:

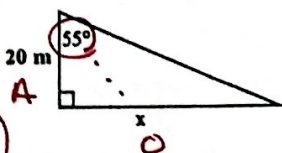
$$\sin \theta = \frac{O}{H} \quad \cos \theta = \frac{A}{H} \quad \tan \theta = \frac{O}{A}$$

Trig buttons:

- Appear as "SIN", "COS", and "TAN" on your calculator.
 - **ALWAYS:** Check that your calculator is in _____ **MODE!!!**
1. $\sin 20 \approx \underline{.3420}$
 2. $\tan 30 \approx \underline{.5774}$
 3. $\cos 5 \approx \underline{.9962}$
 4. $\sin 85 \approx \underline{.9962}$
 5. $\tan 69 \approx \underline{2.6051}$
- cos 5 & sin 85 are complements (add to 90°)*

Step 1	Decide which ratio to use (SOH CAH TOA)
Step 2	Solve to get x by itself
Step 3	Use trig button to find the angle

Ex. 6 Figure out which ratio to use, then find x. Round to the nearest tenth.



O & A...
SOH CAH TOA

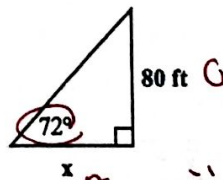
$$\tan 55 = \frac{x}{20}$$

x "up high" → multiply

$$20 * \tan 55 = \underline{28.6}$$

* up high means numerator!

Ex. 7 Find the missing side. Round to the nearest tenth.



O & A...
SOH CAH TOA

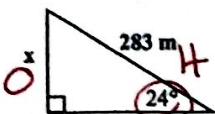
$$\tan 72 = \frac{80}{x}$$

x "down low" → divide

$$\frac{80}{\tan 72} = \underline{26}$$

* down low means denominator

Ex. 8 Find the missing side. Round to the nearest tenth.



O & H...
SOH CAH TOA

$$\sin 24 = \frac{x}{283}$$

"up high" → multiply

$$283 \sin 24 = \underline{115.1}$$

Ex. 9 Find θ . Round to the nearest degree.



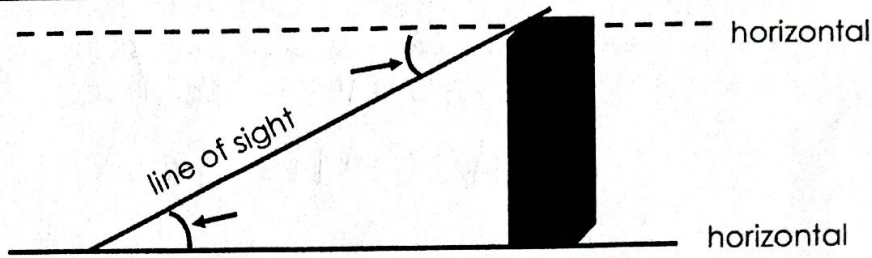
A & H...
SOH CAH TOA

$$\cos 40 = \frac{x}{20}$$

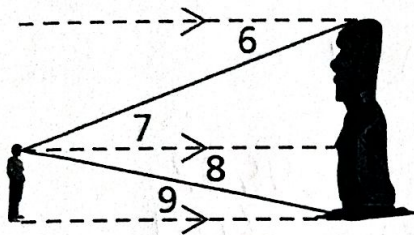
multiply

$$20 \cos 40 = \underline{15.3}$$

Depression and Elevation

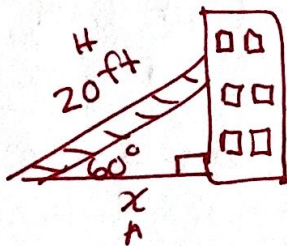


Practice: Classify each of the numbered angles as angle of depression or angle of elevation



- 6. depression
- 7. elevation
- 8. depression
- 9. elevation

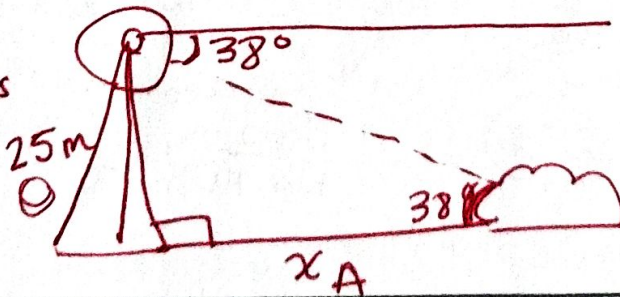
Ex 5. A construction worker leans his ladder against a building making a 60° angle with the ground. If his ladder is 20 feet long, how far away is the base of the ladder from the building?



OH...
 SOH CAH TOA
 $\cos 60 = \frac{x}{20}$
 up high multiply $20 \cos 60 = 10 \text{ ft}$

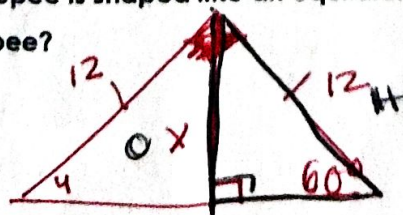
Ex 6. The angle of depression from the top of a tower to a boulder on the ground is 38° . If the tower is 25m high, how far from the base of the tower is the boulder? Round to the nearest whole number.

We Alt. Int. \angle 's to find the angle inside of the Δ .



OH...
 SOH CAH TOA
 $\tan 38 = \frac{25}{x}$
 down low divide $25 / \tan 38$

Ex 7. The outline of a teepee is shaped like an equilateral triangle. If the sticks on the side are 12 feet long how tall is the teepee?



OH...
 SOH CAH TOA
 $\sin 60 = \frac{x}{12}$
 up high multiply $12 \sin 60 \approx 10.4 \text{ ft}$