1. OCEAN ARCHAEOLOGY A salvage ship uses sonar to determine the angle of depression to a wreck on the ocean floor that is 40 meters below the surface. How far must a diver, lowered from the salvage ship, walk along the ocean floor to reach the wreck?
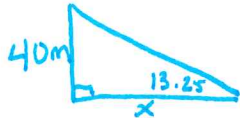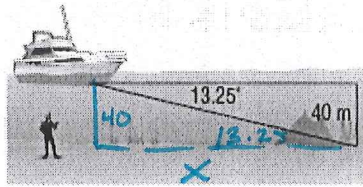
$x \tan(13.25) = \dfrac{40}{x} \cdot x$

$x \tan(13.25) = 40$

$\dfrac{x \tan(13.25)}{\tan(13.25)} = \dfrac{40}{\tan(13.25)}$

$x = 169.87m$

2. STANDARDIZED TEST EXAMPLE From the top of a 150-foot high tower, an air traffic controller observes an airplane on the runway. Which equation would be used to find the distance from the base of the tower to the airplane?
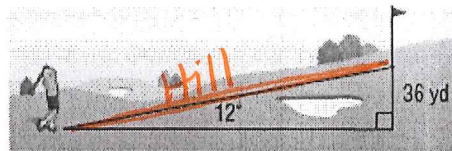
$\tan(12) = \dfrac{150}{x}$

$x \tan(12) = 150$

$x = 705.69 ft$

3. GOLF A golfer is standing at the tee, looking up to the green on a hill. If the tee is 36 yards lower than the green and the angle of elevation from the tee to the hole is 12°, find the distance from the tee to the hole.
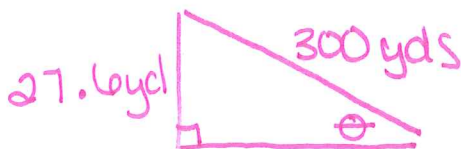
$\sin(12) = \dfrac{36}{x}$

$x = 173.15 yd$

4. TOURISM Crystal is on a bus in France with her family. She sees the Eiffel Tower at an angle of 27°. If the tower is 986 feet tall, how far away is the bus? Round to the nearest tenth.
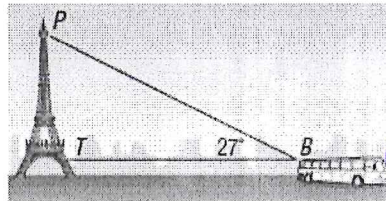
$\tan(27) = \dfrac{986}{x}$

$x = 1935.13 ft$

5. SLEDDING A sledding run is 300 yards long with a vertical drop of 27.6 yards. Find the angle of depression of the run.

27.6yd   300 yds   θ

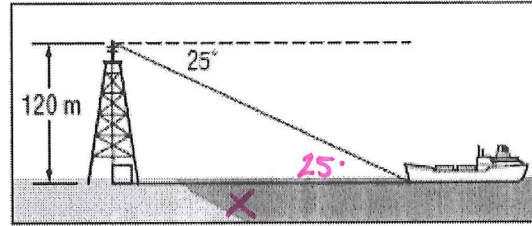① $\sin\theta = \dfrac{27.6}{300}$

② $\theta = \sin^{-1}\left(\dfrac{27.6}{300}\right)$

③ $\theta = 5.28°$

must have these three steps

6. The top of a signal tower is 120 meters above sea level. The angle of depression for the top of the tower to a passing ship is 25°. What is the distance from the foot of the tower to the ship?
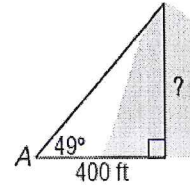
$$\tan(25) = \frac{120}{x}$$

$$x \approx 257.34 \, m$$

7. The angle of elevation from point A to the top of a hill is 49°. If point A is 400 feet from the base of the hill, how high is the hill?

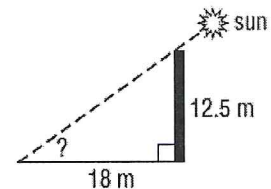$$\tan(49°) = \frac{x}{400}$$

$$x \approx 460.15 \, ft$$

8. Find the angle of elevation of the sun when a 12.5-meter-tall telephone pole casts an 18-meter-long shadow.

$$\tan\theta = \frac{12.5}{8}$$
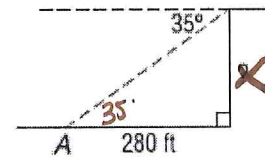
$$\theta = \tan^{-1}\left(\frac{12.5}{8}\right)$$

$$\theta = 34.78°$$

9. The angle of depression from the top of a sheer cliff to point A on the ground is 35°. If point A is 280 feet from the base of the cliff, how tall is the cliff?

$$\tan(35°) = \frac{x}{280}$$

$$x = 196.06 \, ft$$

10. The angle of depression from a balloon on a 75-foot string to a person on the ground is 36°. How high is the balloon?

$$\sin(36) = \frac{x}{75}$$

$$x \approx 44.08 \, ft$$