Geometry

Right Triangles Applications Worksheet

Solve each word problem. Be sure to draw and label a picture and show all work.

1. The flagpole in front of CB South casts a shadow 40 feet long when the measurement of the angle of elevation to the sun is 31 degrees. How tall is the flagpole?

\[ 40 \cdot \tan 31^\circ = \frac{x}{40} \cdot 40 \]
\[ 40 \cdot \tan 31^\circ = x \]
\[ x = 24 \text{ ft.} \]

2. Jesse is standing 300 meters from the base of a radio tower. According to his astrolabe, the measurement of the angle of elevation to the top of the tower is 40 degrees. How high is the tower?

\[ 300 \cdot \tan 40^\circ = \frac{x}{300} \cdot 300 \]
\[ 300 \cdot \tan 40^\circ = x \]
\[ x = 251.7 \text{ m} \]

3. According to the pilot’s instruments, the measurement of the angle of depression of the aircraft carrier from a plane 1000 feet above the water is 63 degrees. How far is the plane from the carrier?

\[ x \cdot \tan 63^\circ = \frac{1000}{x} \cdot x \]
\[ x \cdot \tan 63^\circ = 1000 \]
\[ x = \frac{1000}{\tan 63^\circ} \]
\[ x = 509.5 \text{ ft.} \]

4. Steph is flying a kite to which the angle of elevation is 70 degrees. The string on the kite is 65 meters long. How far is the kite above the ground?

\[ 65 \cdot \sin 70^\circ = \frac{x}{65} \cdot 65 \]
\[ 65 \cdot \sin 70^\circ = x \]
\[ x = 61.1 \text{ m} \]
5. A tree was broken in a recent storm. The top of the tree touches the ground 13 meters from the base. The top of the tree makes an angle of 29 degrees with the ground. How tall was the tree before it was broken?

\[
\begin{align*}
X \cdot \cos 29^\circ &= \frac{13}{x} \cdot x \\
X \cdot \cos 29^\circ &= \frac{13}{\cos 29^\circ} \\
X &= \frac{13}{\cos 29^\circ} \\
X &= 14.9 \text{ m}
\end{align*}
\]

6. Thomas is an architect designing a new parking garage for the city. The floors of the garage are to be 20 feet apart. The exit ramps between each pair of floors are to be 120 feet long. What is the measurement of the angle of elevation of each ramp?

\[
\begin{align*}
\sin \theta &= \frac{20}{120} \\
\theta &= \sin^{-1} \left( \frac{20}{120} \right) \\
\theta &= 9.6^\circ
\end{align*}
\]

7. A railroad track rises 10 feet for every 400 feet along the track. What is the measurement of the angle the track forms with the horizontal?

\[
\begin{align*}
\tan \theta &= \frac{10}{400} \\
\theta &= \tan^{-1} \left( \frac{10}{400} \right) \\
\theta &= 1.4^\circ
\end{align*}
\]

8. Tom and Felicia are observing the Washington Monument from \(\frac{1}{4}\) mile away. The monument is 555 feet tall. What is the angle of elevation from Tom and Felicia to the top of the monument?

\[
\begin{align*}
\tan \theta &= \frac{555}{1320} \\
\theta &= \tan^{-1} \left( \frac{555}{1320} \right) \\
\theta &= 22.8^\circ
\end{align*}
\]