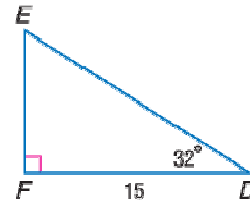


Lesson 11-5

Example 1

In $\triangle DEF$, find DE to the nearest tenth.



Solution

Decide which trigonometric ratio relates the unknown side to the known angle and the known side. \overline{DF} is adjacent to $\angle D$. \overline{DE} is the hypotenuse. The ratio that relates an adjacent side with the hypotenuse is the cosine ratio.

Write and solve an equation involving the trigonometric ratio and the known values. Use a calculator to approximate $\cos 32^\circ$.

$$\cos 32^\circ = \frac{DF}{DE} \quad \begin{array}{l} \text{adjacent side} \\ \text{hypotenuse} \end{array}$$

$$0.8480 \approx \frac{15}{DE}$$

$$0.8480 \cdot DE \approx 15$$

$$\frac{0.8480DE}{0.8480} \approx \frac{15}{0.8480}$$

$$DE \approx 17.6887$$

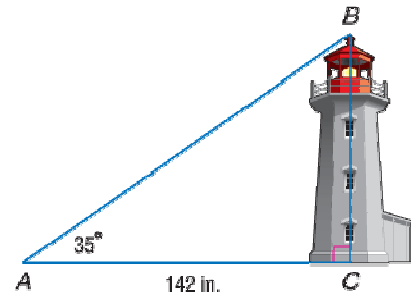
The length of \overline{DE} is approximately 17.7.

Example 2

SAFETY From a distance of 142 m, the angle formed between the ground and the top of a lighthouse is 35° . How tall is the lighthouse?

Solution

Draw a picture of the lighthouse, and label the given information to decide which trigonometric ratio to use. \overline{BC} is opposite $\angle A$. \overline{AC} is adjacent to $\angle A$. The ratio that relates an opposite side with an adjacent side is the tangent ratio. Write and solve an equation involving the trigonometric ratio and the known values.



$$\tan 35^\circ = \frac{BC}{142} \quad \begin{array}{l} \text{opposite side} \\ \text{adjacent side} \end{array}$$

$$0.7002 \square \frac{BC}{142}$$

$$142 \cdot 0.7002 \square BC$$

$$99.4284 \square BC$$

The height of the lighthouse is approximately 99.4 m.

Example 3

Find the value of n in the figure shown.

Solution

Use trigonometric ratios to find XZ and YZ .

$$\tan 40^\circ = \frac{XZ}{80}$$

$$0.8391 \square \frac{XZ}{80}$$

$$80 \cdot 0.8391 \square XZ$$

$$67.128 \square XZ$$

$$\tan 15^\circ = \frac{YZ}{80}$$

$$0.2679 \square \frac{YZ}{80}$$

$$80 \cdot 0.2679 \square YZ$$

$$21.432 \square YZ$$

Subtract YZ from XZ to find n , the length of XY .

$$67.128 - 21.432 = 45.696$$

So n is approximately 45.7 mm.

