

Answer on Question #44186 – Math - Trigonometry

An airplane is flying at an altitude of 6000 m over the ocean directly towards a coastline. At a certain time, the angle of depression to the coastline from the airplane is 14 degrees. How much farther (to the nearest kilometer) does the airplane have to fly before it is directly above the coastline?

Solution

In a triangle of the plane, the coast line and the point where the plane is over the coast line, the angle at the plane is 14° and the side across from this angle (distance from coastline straight up to point where plane is above it) is 6000 m, so if the diagonal line from the plane to the coastline is x , we know that $x \sin 14^\circ = 6000 \text{ m}$, or $x = \frac{6000}{\sin 14^\circ}$. We are looking for the length of the third side, let's call that y and we know that $x \cos 14^\circ = y$ so

$$y = \left(\frac{6000}{\sin 14^\circ} \right) \cos 14^\circ = 6000 \cot 14^\circ = 6000 \cdot 4.01 = 24060 \text{ m} = 24 \text{ km}.$$

Answer: 24 km.