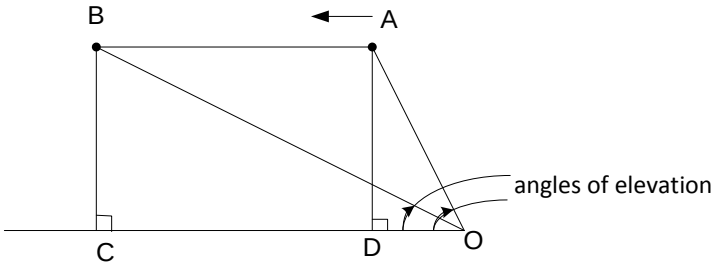
An aeroplane is moving one km high from west to east horizontally from a point on the ground. The angle of elevation of the aeroplane is $60°$ and after 10 sec the angle of elevation of the plane is observed as $30°$. Find the speed of the plane in km/hr.

Solution:



Given:

$AD = BC = 1\text{km}, \angle AOD = 60°, \angle BOD = 30°$

Let x be the distance of the observer to the point on the ground at the beginning

$x = OD$

In ΔAOD $\tan\angle AOD = \frac{AD}{OD}$, so

$$OD = \frac{AD}{\tan\angle AOD} = \frac{1}{\tan 60°} = 0.58\text{km}$$

Let y be the distance of the observer to the point on the ground at the end

$y = OC$

In ΔBOC $\tan\angle BOC = \frac{BC}{OC}$, so

$$OC = \frac{BC}{\tan\angle BOC} = \frac{1}{\tan 30°} = 1.73\text{km}$$

So the plane is flying for 10 seconds

$y - x = 1.73 - 0.58 = 1.15\text{km}$

The speed of the plane is

$$V = \frac{1.15}{10} = 0.115\ \text{km/sec} = 0.115\ \times 3600 = 414\ \text{km/hr}$$

Answer: The speed of the plane is $414\ \text{km/hr}$.

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