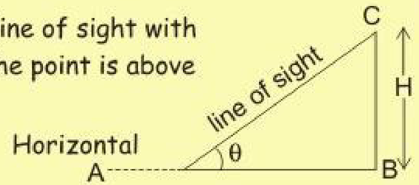
Heights & Distances

Angle of Elevation

Angle formed by the line of sight with the horizontal when the point is above the horizontal.



θ = Angle of elevation

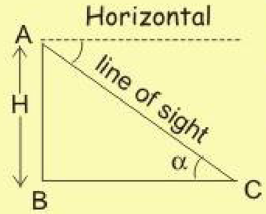
Height of tower
BC = AB × tan θ
(given AB & θ)

Applications

- @ Navigation
- @ Land surveys
- @ Buildings
- @ Optics
- @ Statics
- @ Crystallography

Angle of Depression

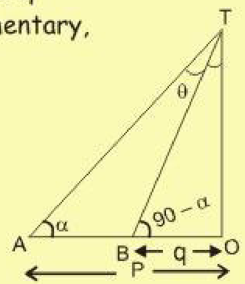
Angle formed by the line of sight with the horizontal when the point is below the horizontal.



α = Angle of Depression

Height of tower
AB = tan α × BC
(given α & BC)

The angle of elevation of the top of a tower, as seen from two points A & B situated in the same line and at distances 'p' and 'q' respectively from the foot of the tower, are complementary, then show that the height of the tower is $\sqrt{pq}$



Sol. In ΔAOT,

$\tan\alpha = \frac{OT}{OA} = \frac{h}{p}$ .... (I)

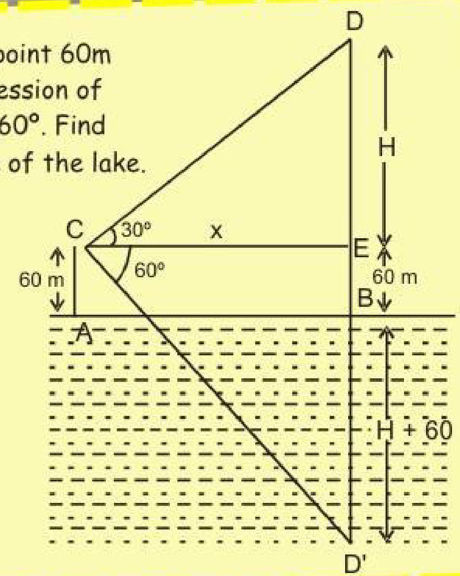
In ΔBOT

$\Rightarrow \tan(90-\alpha) = \frac{OT}{OB} = \frac{h}{q}$ or $\cot\alpha = \frac{h}{q}$ ....(ii)

Multiplying (i) and (ii) , we have

$\Rightarrow \tan\alpha \cot\alpha = \frac{h}{p}\times\frac{h}{q} \Rightarrow 1 = \frac{h^2}{pq} \Rightarrow h = \sqrt{pq}$

The angle of elevation of a cloud from a point 60m above a lake is 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud from the surface of the lake.



$\tan 30° = \frac{H}{x} \Rightarrow x = \sqrt{3}H$ ... (i)

$\tan 60° = \frac{H+120}{x} \Rightarrow x = \frac{H+120}{\sqrt{3}}$ ... (ii)

From eq. (i) and (ii)

3H = H + 120

⇒ H = 60m

Height of the cloud from the surface of the lake = H + 60 = 60 + 60 = 120m