

Chapter-Some Applications of Trigonometry

Q1.

A round balloon of radius r subtends an angle α at the eye of the observer, while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin \beta \csc \frac{\alpha}{2}$.

Q2.

If the angle of elevation of a cloud from a point h meter above a lake has measure α and the angle depression of its reflection of in the lake has measure β . Prove that the height of the cloud is $\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$

Q3.

From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β . Show that the height in miles of aeroplane above the road is given by

$$\frac{\tan \alpha \tan \beta}{\tan \alpha + \tan \beta}$$

Q4

Two stations due South of a leaning tower which leans towards the North, are at distances a and b from its foot. If α and β are the elevations of the top of the tower from these stations, then prove that its inclination θ to the horizontal is given by

$$\cot \theta = \frac{b \cot \alpha - a \cot \beta}{b - a}$$

Q5

From a point on the ground the angle of elevation of top of a tower is α . On moving 'a' meter towards the tower, the elevation changes to

$$\frac{a \tan \alpha \tan \beta}{\tan \beta - \tan \alpha}$$

β . Prove that the height of the tower is

Q6.

If the angles of elevation of the top of a tower from two points distant a and b ($a > b$) from its foot and in the same straight line from it are respectively 30° and 60° , then find the height of the tower.

Q7.

A boy standing on a horizontal plane finds a bird, flying at a distance of 100 m from him at an elevation of 30° . A girl standing on the roof of a 20 m high building finds the angle of elevation of the same bird to be 45° . Both the boy and the girl are on the opposite side of the bird. Find the distance of the bird from the girl.

Q8.

A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. 10 seconds later, the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point.

Q9.

A ladder rests against a wall at an angle α to the horizontal. Its foot is pulled away from the B wall through a distance p , so that it slides a distance q down the wall making an angle β with the horizontal. Prove that :

$$\frac{p}{q} = \frac{\cos \beta - \cos \alpha}{\sin \alpha - \sin \beta}$$

Q10.

From a window (9 m above the ground) of a house in a street, the angles of elevation and depression of the top and foot of another house on the opposite side of the street are 30° and 60° respectively. Find the height of the opposite house and the width of the street