CH – 9 APPLICATION OF TRIGONOMETRY

Practice Sheet 1

Q1.From the top of a building 60 m high the angles of depressions of the top and the bottom of a tower are observed to be 30^0 and 60^0 .Find the height of the tower .

Q2. From a point on the ground the angles of elevation of the bottom and top of a water tank kept at the top of 20 m high tower are 45^0 and 60^0.Find the height of the water tank .

Q3. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60^0 .When he moves 40 meters away from the bank , he finds the angle of elevation to be 30^0. Find the height of the tree and the width of the river .

Q4.The angle of elevation of the top of a tower from a point A on the ground is 30^0.On the ground is 30^0.On moving a distance of 20 meters towards the foot of the tower at a point B ,the angle of elevation increases to 60^0 . Find the height of the tower and the distance of the tower from the point A.

Q5. A flagstaff stands on the top of a 5 m high tower. From a point on the ground, the angle of elevation of the top of the flagstaff is 60^0 and from the same point, the angle of elevation of the top of the tower is 45^0. Find the height of the flagstaff.

Q6. The shadow of a tower, when the angle of elevation of the sun is 45°, is found to be 10 meters longer than when the angle of elevation is 60°. Find the height of the tower.

Q7. On a horizontal plane, there is a vertical tower with a flagpole on the top of the tower. At a point 9 meters away from the foot of the tower the angle of elevation of the top and bottom of the flagpole are 60° and 30° respectively. Find the height of the tower and the flagpole mounted on it.

Q8. 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°. The boy and the girl are on the opposite sides of the bird. Find the distance of the bird from the girl.

Q9. From the top of a building 15 m high the angle of elevation of the top of a tower is found to be 30°. From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower and the distance between the tower and building.

Q10. At a point on level ground,the angle of elevation of a vertical tower is found to be such that its tangent is $\frac{5}{12}$.On walking 192m towards the tower,the tangent of the angle becomes $\frac{3}{4}$.Find the height of the tower.

Q11. Two men on either side of the cliff 80 m high observes the angles of elevation of the top of the cliff to be 30° and 60° respectively. Find the distance between the two men.

Q12. An aeroplane, when 1500 m high passes vertically above another aeroplane at an instance when the angles of the two aeroplanes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the two aeroplanes.

Q13. The angle of elevation of a jet plane from a point A on the ground is 60◦. After a flight of 30 seconds, the angle of elevation changes to 30◦. If the jet plane is flying at a constant height of 1500 $\sqrt{3}$ metres, find the speed of the jet plane.

Q14. An aeroplane flying horizontally 1 km above the ground is observed at an elevation of 60◦. After 10 seconds, its elevation is observed to be 30◦. Find the speed of the aeroplane in km/hr.

Q15. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary. Find the height of the tower .

Q16. The horizontal distance between two towers is 140 m. The angle of elevation of the top of the first tower when seen from the top of the second tower is 30^0. If the height of the second tower is 60 m , find the height of the first tower**.**

Q17. The angle of elevation of the top of a hill at the foot of a tower is 60^0 and the angle of elevation of top of the tower from the foot of the hill is 30^0. If the tower is 50 m high, what is the height of the hill ?

Q18. The angles of elevation and depression of the top and the bottom of a light house from the top of a building, 60 m high, are 30◦ and 60◦ respectively. Find
(i) the difference between the heights of the light house and the building .
(ii) distance between the light house and the building .

Q19. A bird is sitting on the top of a tree, which is 80m high. The angle of elevation of the bird, from a point on the ground is 45◦. The bird flies away from the point of observation horizontally and remains at a constant height. After 2 seconds, the angle of elevation of the bird from the point of observation becomes 30◦. Find the speed of the flying bird .

Q20. As observed from the top of a lighthouse, 100 m above sea level, the angle of depression of a ship, sailing directly towards it, changes from 30◦ to 45◦. Determine the distance travelled by the ship during the period of observation.

Q21. From a window 15 m high above the ground 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^o and 45^o, respectively. Show that the height of the opposite house is 23.66 m. [take $\sqrt{3}$=1.732]

Q22. From the top of a cliff 50m high, the angles of depression of the top and bottom of a tower are observed to be 30° and 45°.Find the height of tower .

Q23. A man on the top of the vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change its measure from 30^0 to 45^0, how soon after this, will the car reach the tower ?

Q24. The angles of depression of the top and the bottom of a building 50 m high are observed from the top of a tower are 30◦ and 60◦ respectively. Find the height of the tower and the horizontal distance between the building and the tower.

Q25. Two ships are there in the sea on either side of the lighthouse , the angles depression of two ships are observed from the top of the light house are 60º and 45º respectively. If the distance between the ships in metres ,, find the height of the lighthouse .

Q26. From a building 60 m high, the angles of depression of the top and bottom of a lamp post are observed to be 30° and 60° respectively . Find the distance between the lamp post and building . Also find the difference of height between lamp post and building..

Q27*. A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height h .At a point on the plane, the angles of elevation of the end bottom of the flagstaff are a and b respectively. Prove that the height of the tower is $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$.

Q28*. 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 $\frac{\tan \alpha \tan \beta}{\tan \alpha + \tan \beta}$.

Q29*.If the angle of elevation of a cloud from a point h meters above a lake is a and the angle of depression of its reflection in the lake be b, prove that the distance of the cloud from the point of observation is $\frac{2h \sec \alpha}{\tan \beta - \tan \alpha}$.

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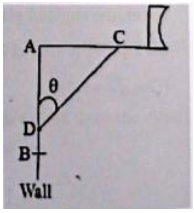
ADDITIONAL QUESTIONS

Q30.The road AC of a TV disc antenna is fixed at right angles to the wall AB and a rod CD is supporting the disc as shown in figure.If AC = 1.5m long and CD = 3m , find



(i) tan θ
(ii)sec $\theta + cosec\ \theta$

Q31.From a balloon vertically above a straight road ,the angles of depression of two cars at an instant are found to be 45^0 and 60^0.If the cars are 100 m apart ,find the height of the balloon .

Q32.The angle of elevation of a jet aircraft from a point P on the ground is 60^0.After a flight of 30 seconds ,the angle of elevation becomes half of the previous angle.If the jet is flying at a speed of 84km/hr,find the constant height at which the jet is flying .($\sqrt{3} = 1.73$)

Q33.The lower window of a house is at a height of 2m above the ground and its upper window is 4m vertically above the lower window .At certain instant the angles of elevation of a balloon from these windows are observed to be 60^0 and 30^0 respectively .Find the height of the balloon above the ground.

Q34. A man sitting at a height of 20m on a tall tree on a small island in the middle of a river observes two poles directly opposites to each other on the two banks of the river and in line with the foot of tree. If the angles of depression of the feet of the poles from a point at which the man is sitting on the tree on either side of the river are 60° and 30° respectively. Find the width of the river.

Q35. The angle of elevation of a cloud from a point 60 m above a lake is 30° and the angle of depression of the reflection of cloud in the lake is 60°. Find the height of the cloud.

Q36. Two ships are sailing in the sea on either side of the lighthouse; the angles of depression of two ships as observed from the top of the lighthouse are 60° and 45° respectively. If the distance between the ships is 200 $\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$meters, find the height of the lighthouse.

Q37. A boy is standing on the ground and flying a kite with 120 m of string at an elevation of 300. Another boy is standing on a roof of a 14 m high building and is flying his kite at an elevation 45°. Both the boys are on opposite sides of both the kites. Find the length of the string (in meters), that the second boy must have so that the two kites meet.

Q38. 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.(Given $\sqrt{2} = 1.414$)

Q39. From a window 15 m high above the ground .The angles of elevation and depression of the top and bottom of another house on the opposite side of the street are 30° and 45°, respectively. Find the height of the house .(Use $\sqrt{3} = 1.732$)

Q40. A moving boat is observed from the top of a 150 m high cliff moving away from the cliff. The angle of depression of the boat changes from 60° to 45° in 2 minutes. Find the speed of the boat in m/min.(use $(\mathbf{Use}\ \sqrt{3} = 1.732$)

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