APPLICATION OF TRIGONOMETRY

CLASS X (2025-26) SUJITHKUMAR KP 15-8-25

1 The angle of elevation of the top of a tower from a point 20 metres away from the base is 45°. Find the height of the tower.

2 If two towers of height h_1 and h_2 subtends angles of 60° and 30° respectively at the mid points of line joining their feet, find $h_1 : h_2$.

3 Find the angle of elevation of the top of 15 m high tower at a point 15 m away from the base of the tower.

4 A ladder, leaning against a wall, makes an angle of 60° with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder.

5 A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and angle of depression of the base of the hill as 30°. Find the distance of the hill from the ship and height of the hill.

6 The angle of elevation of the top of a tower from a point A on the ground is 30°. On moving a distance of 20 metres towards the foot of the tower to a point B, the angle of elevation increases to 60°. Find the height of the tower and distance of the tower from the point A. ($\sqrt{3}$ = 1.732)

7 A statue 1.46 m tall stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point, the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal. ($\sqrt{3}$ = 1.73)

8 On a horizontal plane there is a vertical tower with a flag pole on the top of the tower. At a point 9 metres away from the foot of the tower the angles of elevation of the top and bottom of the flag pole are 60° and 30° respectively. Find the heights of the tower and flag pole mounted on it. ($\sqrt{3}$ = 1.732)

9 The shadow of a flagstaff is three times as long as the shadow of the flagstaff when the sunrays meet the ground at an angle of 60°. Find the angle between the sunrays and the ground at the time of longer shadow

10 A man rowing a boat away from a lighthouse 150 m high takes 2 minutes to change the angle of elevation of the top of lighthouse from 45° to 30°. Find the speed of the boat. (Use $\sqrt{3}$ = 1.732)

11 A person standing on the bank of a river observes that the angle of the elevation of the top of a tree standing on the opposite bank is 60°. When he moves 40 m away from the bank, he finds the angle of elevation to be 30°. Find the height of the tree and the width of the river. ($\sqrt{3}$ = 1.732)

12 An aeroplane when flying at a height of 3125 m from the ground passes vertically below another plane at an instant when the angles of elevation of the two planes from the same point on the ground are 30° and 60° respectively. Find the distance between the two planes at that instant.

13 A man on the deck of a ship, 12 m above water level, observes that the angle of elevation of the top of a cliff is 60° and the angle of depression of the base of the cliff is 30°. Find the distance of the cliff from the ship and the height of the cliff. [Use $\sqrt{3}$ = 1.732]

14 As observed from the top of a light-house, 100 m high above sea level, the angle of depression of a ship, sailing directly towards it, changes from 30° to 60°. Determine the distance travelled by the ship during the period of observation. (Use $\sqrt{3}$= 1.732)

15 Two ships are there in the sea on either side of a light house in such a way that the ships and the light house are in the same straight line. The angles of depression of two ships as observed from the top of the light house are 60° and 45°. If the height of the light house is 200 m, find the distance between the two ships. [Use $\sqrt{3}$ = 1.73]

16 The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 45°. If the tower is 30 m high, find the height of the building.

17 The angle of elevation of the top of a vertical tower from a point on the ground is 60°. From another point 10 m vertically above the first, its angle of elevation is 30°. Find the height of the tower.

18 The angle of elevation of the top of a tower at a distance of 120 m from a point A on the ground is 45°. If the angle of elevation of the top of a flagstaff fixed at the top of the tower, from A is 60°, then find the height of the flagstaff. [Use $\sqrt{3}$ = 1.73]

19 The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. At a point Y, 40 m vertically above X, the angle of elevation is 45°. Find the height of the tower PQ.

20 The angle of elevation of a jet fighter from a point A on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the jet is flying at a speed of 720 km/hr, find the constant height. ($\sqrt{3}$ = 1.732).

21 The angle of elevation of an aero plane from a point on the ground is 60°. After a flight of 30 seconds the angle of elevation becomes 30°. If the aero plane is flying at a constant height of $3000\sqrt{3}$ m, find the speed of the aero plane.

22 The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the plane in km/hr.

23 The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed in km/hr of the plane.

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

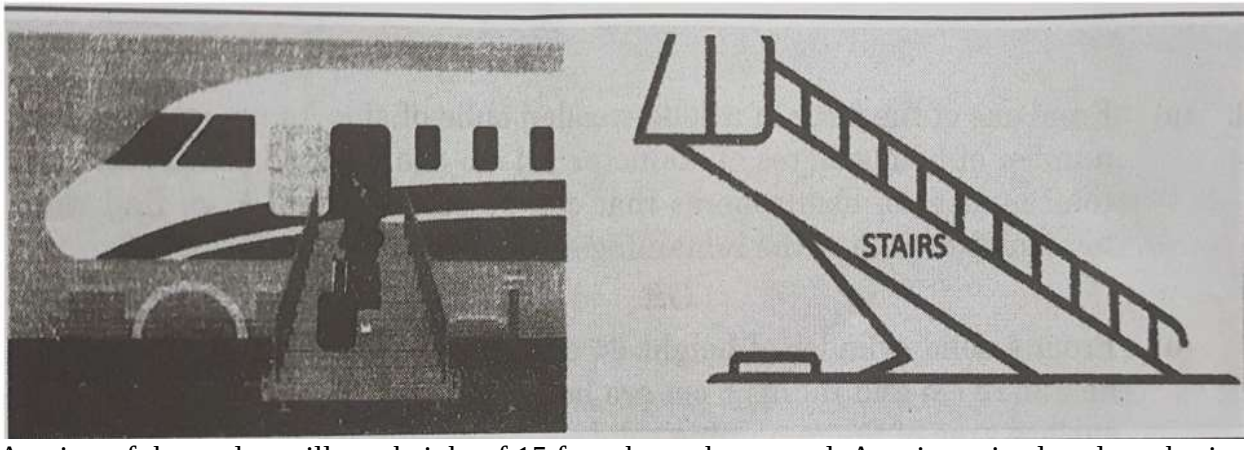
25 From the top of a building 15 m high, the angle of elevation of the top of a tower is found to be 30°. From the bottom of the same building, the angle of elevation of the top of the tower is found to be 45°. Determine the height of the tower and the distance between the tower and the building.

26 A parachutist is descending vertically and makes angles of depression of 45° and 60° at two observation points 100 m apart from each other on the left side of himself. Find, in metres, the approximate height from which he falls and also find, in metres the approximate distance of the point where he falls on the ground from the first observation point.

27 At a point A, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30°. The angle of depression of the reflection of the cloud in the lake, at A is 60°. Find the distance of the cloud from A.

28 A highway leads to the foot of 300 m high tower. An observatory is set at the top of the tower. It sees a car moving towards it at an angle of depression of 30°. After 15 seconds angle of depression becomes 60°.
(a) Find the distance travelled by the car during this time.
(b) How this observatory is helpful to regulate the traffic on the highway?

29 Passengers boarding stairs, sometimes referred to as boarding ramps, stair cars or air craft steps, provide a mobile means to travel between the air craft doors and the ground. Larger air craft have door sills 5 to 20 feet (1 foot = 30 cm) high. Stairs facilitate safe boarding and de- boarding. CBSE AJMER 2025



An air craft has a door sill at a height of 15 feet above the ground. A stair car is placed at a horizontal distance of 15 feet from the plane.
Based on the given information, answer the following questions given in part (i) and (ii).

(i) Find the angle at which the stairs are inclined to reach the door sill 15 feet high above the ground.

(ii) Find the length of the stairs used to reach the door sill.

Further, answer any **one** of the following questions

(iii) (a) If the 20 feet long stairs is inclined at an angle of $60°$ to reach the door sill, then find the height of the door sill above the ground ($\sqrt{3} = 1.732$)

OR

(b) What should be the shortest possible length of the stairs to reach the door sill of the plane 20 feet above the ground , if the angle of elevation cannot exceed $30°$? Also find the horizontal distance of base of the stair car from the plane.