# Some Applications of Trigonometry

1 Mark:

1. If a tower 30 m high, casts a shadow $10\sqrt{3}\ m$ long on the ground, then what is the angle of elevation of the sun?
    CBSE 2017, Outside Delhi (30/1)

2. The ratio of the height of a tower and the length of its shadow on the ground is $\sqrt{3} : 1$. What is the angle of elevation of the sun?
    CBSE 2017, Delhi (30/1/1)

3. A ladder 15 m long makes an angle of 60° with the wall. Find the height of the point where the ladder touches the wall.
    CBSE 2017, Foreign (30/2/1)

4. A pole 6 m high casts a shadow $2\sqrt{3}\ m$ long on the ground, then find the angle of elevation of the sun.
    CBSE Sample Paper 2017

5. An observer, 1.7 m tall, is $20\sqrt{3}\ m$ away from a tower. The angle of elevation from the eye of observer to the top of tower is 30°. Find the height of tower.
    CBSE 2016, Foreign (30/2/1)

6. In figure, AB is a 6 m high pole and CD is a ladder inclined at an angle of 60° to the horizontal and reaches up to a point D of pole. If $AD = 2.54\ m$, find the length of the ladder. $\left(\text{Use } \sqrt{3} = 1.73\right)$
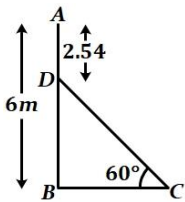

    CBSE 2016, Delhi (30/1/1)

7. 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.
    CBSE 2016, Outside Delhi (30/1)

8. If the ratio between the length of the shadow of a tower and its height is $\sqrt{3} : 1$, then what is the angle of elevation of Sun?
    CBSE Sample Paper 2015

9. The tops of two towers of height x and y, standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x : y$.
    CBSE 2015, Delhi (30/1/1)

10. A pole casts a shadow of length $2\sqrt{3}\ m$ on the ground, when the sun's elevation is 60°. Find the height of the pole.
    CBSE 2015, Foreign (30/2/1)

11. In figure a tower AB is 20 m high and BC, its shadow on the ground, is $20\sqrt{3}\ m$ long. Find the Sun's altitude.
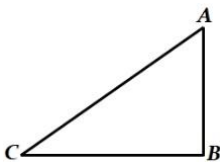
    CBSE 2015, Outside Delhi (30/1)

12. The angle of depression of a car parked on the road from the top of a 150 m high tower is 30°. The distance of the car from the tower (in metres) is
    CBSE 2014, Outside Delhi (30/1), (30/2), (30/3)

    A) $50\sqrt{3}$ B) $150\sqrt{3}$ C) $150\sqrt{2}$ D) 75

13. The angle of depression of a car, standing on the ground, from the top of a 75 m, high tower, is 30°. The distance of the car from the base of the tower (in m) is :
    CBSE 2013, Delhi (30/1/1)

    A) $25\sqrt{3}$ B) $50\sqrt{3}$ C) $75\sqrt{3}$ D) 150

14. The length of shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. The angle of elevation of sun is:
    CBSE 2012, Delhi (30/1/1)

    A) 45°   B) 30°   C) 60°   D) 90°

15. From a point on the ground which is 15 m away from the foot of a vertical tower, the angle of elevation of the top of the tower, is found to be 60°. The height of the tower (in metres) is
    CBSE 2012, Foreign (30/2/1)

    A) $5\sqrt{3}$ B) $15\sqrt{3}$ C) 15   D) 7.5

16. A kite is flying at a height of 30 m from the ground. The length of string from the kite to the ground is 60 m. Assuming that there is no slack in the string, the angle of elevation of the kite at the ground is   **CBSE 2012, Outside Delhi (30/1)**

    A) 45°   B) 30°   C) 60°   D) 90°

17. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower is 45°. The height of the tower (in metres) is   **CBSE 2011, Delhi (30/1/1)**

    A) 15   B) 30   C) $30\sqrt{3}$ D) $10\sqrt{3}$

18. At some time of the day, the length of the shadow of a tower is equal to its height. Then the sun's altitude at that time is   **CBSE 2011, Foreign (30/2/1)**

    A) 30°   B) 60°   C) 90°   D) 45°

19. A tower stands vertically on the ground. From a point on the ground which is 25 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 45°. Then the height (in meters) of the tower is   **CBSE 2011, Outside Delhi (30/1)**

    A) $25\sqrt{2}$ B) $25\sqrt{3}$ C) 25   D) 12.5

20. If Fig. what are the angles of depression from the observing positions O_1 and O_2 of the object at A?
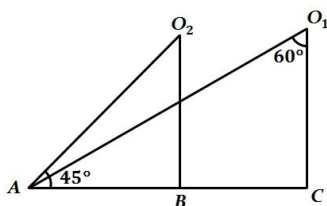
CBSE Sample Paper III 2008

21. The height of a tower is 10 cm. Calculate the height of its shadow when Sun's altitude is 45°.

CBSE Sample Paper II 2008

3 Marks:

1. On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower.   **CBSE 2017, Outside Delhi (30/1)**

2. 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/h.   **CBSE 2017, Delhi (30/1/1)**

3. The shadow of a tower at a time is three times as long as its shadow when the angle of elevation of the sun is 60°. Find the angle of elevation of the sun at the time of the longer shadow.   **CBSE 2017, Foreign (30/2/1)**

4. From the top of a lighthouse 75 m high, the angles of depression of two ships are observed to be 30° and 45° respectively. If one ship is directly behind the other on the same side of the lighthouse then find the distance between the two ships.   **CBSE Sample Paper 2017**

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 the angle of depression of the base of hill as 30°. Find the distance of the hill from the ship and the height of the hill.   **CBSE 2016, Outside Delhi (30/1)**

6. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. $\left(\text{use } \sqrt{3} = 1.73\right)$ **CBSE 2016, Delhi (30/1/1)**

7. Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as 30° and 60°. Find the distance between the two men. $\left(\text{Use } \sqrt{3} = 1.73\right)$ **CBSE 2016, Foreign (30/2/1)**

8. 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.   **CBSE 2015, Outside Delhi (30/1)**

9. 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.

CBSE 2015, Outside Delhi (30/1)

10. 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.
CBSE 2015, Delhi (30/1/1)

11. From the top of a tower of height 50 m, the angles of depression of the top and bottom of a pole are 30° and 45° respectively. Find **CBSE 2015, Foreign (30/2/1)**
    I. how far the pole is from the bottom of a tower,
    II. the height of the pole. (Use $\sqrt{3} = 1.732$)

12. The angle of elevation of an aeroplane from a point on the ground is 60°. After a flight of 30 seconds the angle of elevation becomes 30°. If the aeroplane is flying at a constant height of $3000\sqrt{3}$ m, find the speed of the aeroplane.
CBSE 2014, Outside Delhi (30/1), (30/2), (30/3)

13. From the top of a 60 m high building, the angles of depression of the top and the bottom of a tower are 45° and 60° respectively. Find the height of the tower. [Take $\sqrt{3} = 1 \cdot 73$] **CBSE 2014, Outside Delhi (30/3)**

14. The horizontal distance between two poles is 15 m. The angle of depression of the top of first pole as seen from the top of second pole is 30°. If the height of the second pole is 24 m, find the height of the first pole. [Use $\sqrt{3} = 1.732$]
CBSE 2013, Delhi (30/1/1)

15. The angles of depression of two ships from the top of a light house and on the same side of it are found to be 45° and 30°. If the ships are 200 m, apart, find the height of the light house. **CBSE 2012, Delhi (30/1/1)**

16. From the top of a tower 50 m high, the angle of depression of the top of a pole is 45° and from the foot of the pole, the angle of elevation of the top of the tower is 60°. Find the height of the pole if the pole and tower stand on the same plane. **CBSE 2012, Foreign (30/2/1)**

17. The angles of depression of the top and bottom of a tower as seen from the top of a $60\sqrt{3}$ m high cliff are 45° and 60° respectively. Find the height of the tower. **CBSE 2012, Outside Delhi (30/1)**

18. From the top of a vertical tower, the angles of depression of two cars, in the same straight line with the base of the tower, at an instant are found to be 45° and 60°. If the cars are 100 m apart and are on the same side of the tower, find the height of the tower. [Use $\sqrt{3} = 1.73$] **CBSE 2011, Outside Delhi (30/1)**

19. From the top of a tower 100 m high, a man observes two cars on the opposite sides of the tower with angles of depression 30° and 45° respectively. Find the distance between the cars. [Use $\sqrt{3} = 1.73$] **CBSE 2011, Delhi (30/1/1)**

20. A ladder of length 6 m makes an angle of 45° with the floor while leaning against one wall of a room. If the foot of the ladder is kept fixed on the floor and it is made to lean against the opposite wall of the room, it makes an angle of 60° with the floor. Find the distance between these two walls of the room. **CBSE 2011, Foreign (30/2/1)**

4 Marks:

1. An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45° and 60° respectively. Find the width of the river. [Use $\sqrt{3} = 1.732$] **CBSE 2017, Outside Delhi (30/1)**

2. The angle of elevation of a cloud from a point 60 m above the surface of the water of a lake is 30° and the angle of depression of its shadow in water of lake is 60°. Find the height of the cloud from the surface of water.
CBSE 2017, Delhi (30/1/1)

3. From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. [Use $\sqrt{3} = 1.732$] **CBSE 2017, Foreign (30/2/1)**

4. From a point 100 m above a lake the angle of elevation of a stationary helicopter is 30° and the angle of depression of reflection of the helicopter in the lake is 60°. Find the height of the helicopter above the lake. **CBSE Sample Paper 2017**

5. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45°. The bird flies away horizontally in such a way that is remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30°. Find the speed of flying of the bird. (Take $\sqrt{3} = 1.732$)
CBSE 2016, Delhi (30/1/1)

6. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. From a point Y, 40 m vertically above X, the angle of elevation of the top Q of tower is 45°. Find the height of the tower PQ and the distance PX. (Use $\sqrt{3} = 1.73$) **CBSE 2016, Outside Delhi (30/1)**

7. A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5 m. From a point on the ground the angles of elevation of the top and bottom of the flagstaff are 60° and 30° respectively. Find the height of the tower and the distance of the point from the tower.
(take $\sqrt{3} = 1.732$) **CBSE 2016, Foreign (30/2/1)**

8. From the top of tower, 100 m high, a man observes two cars on the opposite sides of the tower with the angles of depression 30° & 45° respectively. Find the distance between the cars.
(Use $\sqrt{3} = 1.73$.) **CBSE Sample Paper 2016**

9. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a 20 m high building are 45° & 60° respectively. Find the higher of the tower. **CBSE Sample Paper 2016**

10. From a point P on the ground the angle of elevation of the top of a tower is 30° and that of the top of a flag staff fixed on the top of the tower, is 60°. If the length of the flag staff is 5 m, find the height of the tower. **CBSE 2015, Delhi (30/1/1)**

11. Two poles of equal heights are standing opposite to each other on either side of the road which is 80 m wide. From a point P between them on the road, the angle of elevation of the top of a pole is 60° and the angel of depression from the top of another pole at point P is 30°. Find the heights of the poles and the distances of the point P from the poles. **CBSE 2015, Foreign (30/2/1)**

12. 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, at A is 60°, then find the height of the flagstaff.
[Use $\sqrt{3} = 1 \cdot 73$] **CBSE 2014, Outside Delhi (30/1), (30/2), (30/3)**

13. 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 the foot of the building is 60°. If the tower is 60 m high, find the height of the building. **CBSE 2013, Delhi (30/1/1)**

14. The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of depression from the top of the tower of the foot of the hill is 30°. If the tower is 50 m high, find the height of the hill. **CBSE 2012, Delhi (30/1/1)**

15. The angle of depression from the top of a tower of a point A on the ground is 30°. On moving a distance of 20 m from the point A towards the foot of the tower to a point B, the angle of elevation of the top of the tower from the point B is 60°. Find the height of the tower and its distance from the point A. **CBSE 2012, Foreign (30/2/1)**

16. 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. **CBSE 2012, Outside Delhi (30/1)**

17. Two poles of equal heights are standing opposite to each other on either side of the road, which is 100 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30°, respectively. Find the height of the poles. **CBSE 2011, Delhi (30/1/1)**

18. The shadow of a tower standing on a level ground is found to be 30 m longer when the sun's altitude is 30° than when it is 60°. Find the height of the tower. **CBSE 2011, Foreign (30/2/1)**

19. 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. **CBSE 2011, Outside Delhi (30/1)**

6 Marks:

1. From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of the foot of the tower is 30°. Find the height of the tower. **CBSE 2010, Delhi (30/1/1)**

2. 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.
[Use $\sqrt{3} = 1 \cdot 732$] **CBSE 2010, Foreign (30/2/1)**

3. A vertical pedestal stands on the ground and is surmounted by a vertical flag staff of height 5 m. At a point on the ground the angles of elevation of the bottom and the top of the flag staff are 30° and 60° respectively. Find the height of the pedestal.   **CBSE 2010, Foreign (30/2/1)**

4. 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. Six second 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.   **CBSE 2009, Delhi (30/1/1)**

5. The angle of elevation of the top of a building from the foot of a tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high, find the height of the building.   **CBSE 2009, Foreign (30/2/1)**

6. 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.   **CBSE 2009, Outside Delhi (30/1)**

7. 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 $km/hour$, of the plane.   **CBSE 2008, Foreign (30/2/1)**

8. An aeroplane, when 3000 m high, passes vertically above another aeroplane at an instant, when the angle of elevation of the two aeroplanes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes. (Use $\sqrt{3} = 1.732$)   **CBSE 2008, Foreign (30/2/2)**

9. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time take by the car to reach the foot of the tower from this point.   **CBSE 2008, Foreign (30/2/3)**

10. There are two poles, one each on either bank of a river, just opposite to each other. One pole is 60 m high. From the top of this pole, the angles of depression of the top and the foot of the other pole are 30° and 60° respectively. Find the width of the river and the height of the other pole.   **CBSE Sample Paper II 2008**

11. From the top of a building 100 m high, the angles of depression of the top and bottom of a tower are observed to be 45° and 60° respectively. Find the height of the tower. Also find the distance between the foot of the building and bottom of the tower.   **CBSE Sample Paper I 2008**

12. The angle of elevation of the top a tower at a point on the level ground is 30°. After walking a distance of 100 m towards the foot of the tower along the horizontal line through the foot of the tower on the same level ground, the angle of elevation of the top of the tower is 60°. Find the height of the tower.   **CBSE Sample Paper I 2008**

13. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. Using the above, solve the following:
A ladder reaches a window which is 12 m above the ground on one side of the street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 9 m high. Find the width of the street if the length of the ladder is 15 m.   **CBSE Sample Paper I 2008**

14. From the top and foot of a tower 40 m high, the angle of elevation of the top of a light house is found to be 30° and 60° respectively. Find the height of the lighthouse. Also find the distance of the top of the lighthouse from the foot of the tower.   **CBSE Sample Paper III 2008**