SUBJECT-MATHEMATICS,   CLASS-X
CHAPTER – APPLICATION OF TRIGONOMETRY
WORSHEET(BASIC)

MCQ

1. If a vertical pole 6 m high casts a shadow $2\sqrt{3}$ m long on the level ground , then the Sun's elevation is

   a) 90^0 b) 45^0 c) 30^0 d) 60^0

2. Length of shadow of a vertical tower on the level ground is $7\sqrt{3}$ m at an instant when the Sun's elevation is 30^0. The height of the tower is

   a) 14 m   b) 7 m   c) $\frac{7}{\sqrt{3}}$ m   d) $\frac{7\sqrt{3}}{2}$ m

3. The length of shadow of a 4 m high vertical pole on the level ground at an instant , when the Sun's elevation is 60^0, is

   a) 2 m   b) $4\sqrt{3}$ m   c) $\frac{4}{\sqrt{3}}$ m   d) 4 m

4. If the length of the shadow of a tower is increasing , then the angle of elevation of the Sun is

   a) increasing   b) decreasing   c) same as before   d) none of these

5. The ratio of the length of a rod and its shadow is 1 : $\sqrt{3}$. The angle of elevation of the Sun is

   a) 30^0 b) 45^0 c) 60^0 d) 90^0

FILL IN THE BLANKS

6. The line drawn from the eye of an observer to the point in the object viewed by the observer is called as _____ .

7. The angle formed by the line of sight with the horizontal when the object viewed is above the horizontal level is called as _____ .

8. _____ are used to find height or length of an object or distance between two distant objects.

VSA

9. In a right triangle , one side other than the hypotenuse is 8 cm and an acute angle is 45^0. What is the length of the hypotenuse?

10. What is the angle of elevation of the Sun when the length of the shadow of a vertical pole is equal to its height?

11. From a point on the ground, 20 m away from the foot of a vertical tower, the angle of elevation of the top of the tower is 60^0. What is the height of the tower ?

12. A vertical tower of height 120 m stands on the ground. The angle of elevation of the top of the tower as observed from a point on the ground is 30^0. Find the distance of the point from the foot of the tower . (Take $\sqrt{3}$ = 1.732)

13. A ladder is placed against a wall of a house such that its upper end is touching the top of the wall. The foot of the ladder is 8 m away from the foot of the wall and the ladder is making an angle of 30^0 with the level of theground . Determine the height of the wall.(Take $\sqrt{3}$ = 1.732)

SHORT ANSWER(TYPE I)

14. The string of a kite is 80 m long and it makes an angle of 60^0 with the horizontal. Find the vertical height of the kite(above the horizontal level), assuming that there is no slack in the string.(Take $\sqrt{3}$ = 1.73)

15. A circus artist is climbing a 20 m long rope , which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole if the angle made by the rope with the ground level is 30^0.

16. Find the angle of elevation of the Sun when the shadow of a pole 'h' m high is $\sqrt{3}$ h m long.

SHORT ANSWER (TYPE II)

17. An observer 1.7 m tall, is $20\sqrt{3}$ m away from the tower. The angle of elevation from the eye of observer to the top of the tower is 30^0. Find the height of the tower.

18. A tree breaks due to storm and the broken part bends, so that the top of the tree touches the ground making an angle 30^0 with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree.

19. A person observed the angle of elevation of the top of a tower as 30^0. He walked 50 m towards the foot of the tower along level ground and found the angle of elevation of the top of the tower as 60^0. Find the height of the tower.

20. As observed from the top of a 75 m tall lighthouse, the angles of depression of two ships are 30^0 and 45^0. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

LONG ANSWER TYPE

21. There is a small island in the middle of a 100 m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on two banks and in the line with the tree. If the angles of elevation of the top of the tree from P and Q are 30^0 and 45^0 respectively, find the height of the tree.

22. 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.

23. From a point on the ground the angles of elevation of the bottom and top of a transmission tower fixed at the top of 20 m high building are 45^0 and 60^0 respectively. Find the height of the transmission tower.

24. 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 m 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.

25. From a point on the ground 40 m away from the foot of a tower, the angle of elevation of the top of the tower is 30^0. The angle of elevation of the top of the water tank (on the top of the tower) is 45^0. Find the
      i)   height of the tower
      ii)   the depth of the tank

26. A vertical tower stands on a horizontal plane and is surmounted by a flag-staff of height 6 m. From a point A on the plane, the angle of elevation of the bottom of the flag-staff is 30^0 and that of the top of the flag-staff is 45^0. Find the distance of the point A from the foot of the tower and the height of the tower.(Take $\sqrt{3} = 1.73$)

27. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60^0.After some time, the angle of elevation reduces to 30^0. Find the distance travelled by the balloon during the interval.
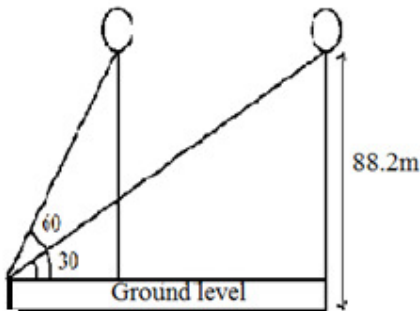
28. From the top of a 60 m high building, the angles of depression of the top and bottom of a tower are 45^0 and 60^0 respectively.Find the height of the tower.(Take $\sqrt{3} = 1.73$)

29. A statue, 1.6 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 60^0 and from the same point, the angle of elevation of the top of the pedestal is 45^0. Find the height of the pedestal.

30. From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60^0 and the angle of depression of its foot is 45^0. Determine the height of the tower.

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MCQ

1. If the angle of elevation of the top of a tower from a distance of 100 m from its foot is 60^0, then the height of the tower is

    a) $100\sqrt{3}$m   b) $\frac{100}{\sqrt{3}}$m   c) $50\sqrt{3}$ m   d) $\frac{200}{\sqrt{3}}$ m

2. If the angles of elevation of a tower from two points distant a and b $(a > b)$ from its foot and in the same straight line from it are 30^0 and 60^0, then the height of the tower is

    a) $\sqrt{a+b}$ b) $\sqrt{ab}$ c) $\sqrt{a-b}$ d) $\sqrt{\frac{a}{b}}$

3. If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the Sun at that time

    a) 30^0 b) 60^0 c) 45^0 d) 75^0

FILL IN THE BLANKS

4. If two buildings of height h_1 and h_2 subtend angles of 60^0 and 30^0 respectively at the mid-point of the line joining their feet, then h_1: h_2 = _____.

5. A ladder reaches a point on a wall which is 20 m above the ground and its foot is $20\sqrt{3}$ m away from the ground. The angle made by the ladder with the wall is _____.

VSA

6. In figure, AB is a 6 m high pole and CD is a ladder inclined at an angle of 60^0 to the horizontal and reaches up to a point D of pole. If AD = 2.54 m, find the length of the ladder.(Take $\sqrt{3}$= 1.73)
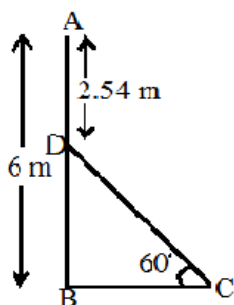
7. If a boy of height 1.5 m stands at a distance of 3 m from a lamp post and casts a shadow of length 4.5 m on the ground , then find the height of the lamp post.

8. In figure , express 'h' in terms of cot function.
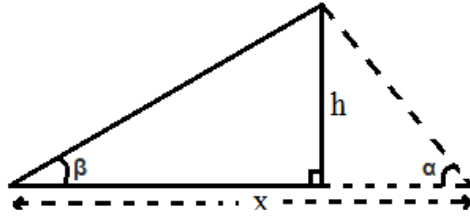
SHORT ANSWER(TYPE I)

9. If 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.

10. The shadow of a tower standing on a level plane is found to be 50 m longer when Sun's elevation is 30^0 than when it is 60^0. Find the height of the tower.

SHORT ANSWER(TYPE II)

11. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are 45^0 and 60^0 respectively. Find the height of the tower and the horizontal distance between the tower and the building.(Take $\sqrt{3}$=1.73)

12. A man observes a car from the top of a tower, which is moving towards the tower with a uniform speed. If the angle of depression of the car changes from 30^0 to 45^0 in 12 minutes, find the time taken by the car now to reach the tower.

13. The angle of elevation of the top of a building from the foot of a tower is 30^0 and the angle of elevation of the top of the tower from the foot of the building is 60^0. If the tower is 60 m high, find the height of the building.

LONG ANSWER TYPE

14. The angle of elevation of an aeroplanefrom a point on the ground is 45^0. After a flight of 15 seconds, the elevation changes to 30^0. If the aeroplane is flying at a constant height of 3000 metres, find the speed of the aeroplane (in km/hr).

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 60^0 and 45^0. If the height of the light house is 200 m, find the distance between the two ships.(Take $\sqrt{3}$=1.73)

16. 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 60^0 to 45^0 in 2 minutes. Find the speed of the boat in m/hr.

17. A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of 30^0. A girl standing on the roof of 20m high building finds the angle of elevation of the same bird to be 45^0. Both the boy and the girl are on opposite sides of the bird. Find the distance of the bird from the girl.(Take $\sqrt{2}$=1.414) s

18. From the top of a hill, the angles of depression of two consecutive

kilometrestones due east are found to be 45^0 and 30^0 respectively. Find the height of the hill.

19. A window of a house is 'h' metres above the ground. From the window, the angles of elevation and depression of the top and the bottom of another house situated on the opposite side of the lane are found to be α and β respectively. Prove that the height of the other house is $h(1 + \tan\alpha\,\cot\beta)$ metres.

20. The lower window of a house is at a height of 2 m above the ground and its upper window is 4 m 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.

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SUBJECT-MATHEMATICS,   CLASS-X
CHAPTER – APPLICATION OF TRIGONOMETRY
WORSHEET(HOTS)

OBJECTIVE QUESTIONS

1. Select the correct option: (**MCQ**)

i)   Two posts are 'a' metres apart and the height of one is double that of the other. If from the middle point of the line joining their feet, an observer finds the angular elevation of their tops to be complementary, then the height of the shorter post is

    a) $\frac{a}{4}$ b) $\frac{a}{\sqrt{2}}$ c) $a\sqrt{2}$ d) $\frac{a}{2\sqrt{2}}$

ii)   A tower subtends an angle of 30^0 at a point on the same level as its foot. At a second point $'h'$ metres above the first, the depression of the foot of the tower is 60^0. The height of the tower is

    a) $\frac{h}{2}$ b) $\sqrt{3}h$ c) $\frac{h}{3}$ d) $\frac{h}{\sqrt{3}}$

iii)   The length of the shadow of a tower standing on level ground is found to be $2x$ metres longer when the Sun's elevation is 30^0 than when it was 45^0. The height of the tower in metres is

    a) $(\sqrt{3}+1)x$ b) $(\sqrt{3}-1)x$ c) $2\sqrt{3}x$ d) $3\sqrt{2}$

2. Solve the followings: (**VSA**)

i)   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 60^0. Find the angle of elevation of the Sun at the time of the longer shadow.

ii)   The tops of two towers of height x and y, standing on level ground, subtend angles of 30^0 and 60^0 respectively at the centre of the line joining their feet, then find $x : y$.
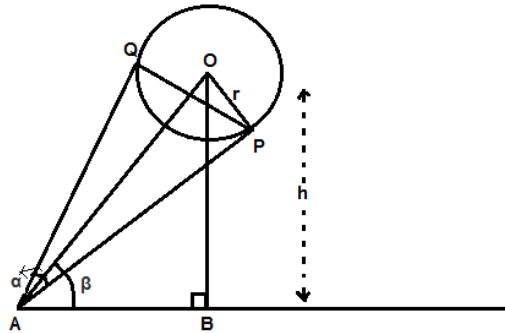
iii) The angle of elevation of the top of an unfinished tower at a point distant 100 m from its base is 45^0. How much higher must the tower be raised so that its angle of elevation at the same point may be 60^0? (Take $\sqrt{3}=1.73$)

SHORT ANSSWER TYPE-I

3. From the top of a tower h metre high, the angles of depressionof two objects, which are in the line with the foot of the tower are α and β ($\beta > \alpha$). Find the distance between the two objects.

4. The angle of elevation of the top of a tower at a point is 45^0. After moving a distance 'p' towards the foot of the tower, the angle of elevation of the top of the tower is found to be θ. Prove that the height of the tower is $\frac{p\tan\theta}{\tan\theta-1}$.

SHORT ANSWER TYPE- II

5. The angle of elevation of a cloud from a point 60 m above a lake is 30^0 and the angle of depression of the reflection of the cloud in the lake is 60^0. Find the height of the cloud.

6. 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 $r\,sin\beta\,cosec\frac{\alpha}{2}$.

LONG ANSWER TYPE

7. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag-staff of height h. At a point on the plane , the angles of elevation of the bottom and the top of the flag-staff are α and β respectively. Prove that the height of the tower is $\frac{h\tan\alpha}{\tan\beta-\tan\alpha}$.

8. A ladder rests against a vertical wall at an inclination α to the horizontal. Its foot is pulled away from the wall through a distance p so that its upper end slides a distance q down the wall and then the ladder makes an angle β to the horizontal. Show that $\frac{p}{q} = \frac{\cos\beta-\cos\alpha}{\sin\alpha-\sin\beta}$.

9. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the height of

the cloud is $\dfrac{h\,(\tan\beta+\tan\alpha)}{\tan\beta-\tan\alpha}$

10. A carpenter makes stools for electricians with a square top of side 0.5 m and at a height of 1.5 m above the ground. Also, each leg is inclined at an angle of 60^0 to the ground. Find the length of each leg and also the lengths of two steps to be put at equal distances.

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