MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

HEIGHTS AND DISTANCES

Multiple Choice Questions

1. The angle of elevation of ladder learing against a house is $58°$ and the toot of the

ladder is 9.6 m from the house. Then the length of the ladder is :

A. $18.10m$

B. $16.36m$

C. $14.36m$

D. None of these.

Answer: A

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2. A person, standing on the bank of a river, observes that the angle subtended by a tree on the opposite bank is 60^0. When he retreates 20m from the bank, he finds the angle to be 30^0. Find the height of the tree and the breadth of the river.

    A. $17.32, 10m$

    B. $17.32, 200m$

    C. $15, 100m$

    D. None of these.

Answer: A

3. From a tower 128 m high, the angle of depression of a car is 30°. Find the distance of the car from the tower

4. At a point A, the angle of elevation of a tower is such that tangent is $\dfrac{5}{12}$, on walking

240 m nearer the tower, the tangent of the angle of elevation is $\dfrac{3}{4}$ Then the height in m) of the tower is:

A. 220

B. 225

C. 224

D. None of these

Answer: B

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5. The height of a chimney when it is found that, on walking towards it 50 m in a bizontal line through its base, the angle of elevation of its kop changes from$30°$ to $45°$ is:

A. $69 - 04m$

B. $59 - 04m$

C. $49.04m$

D. None of these

Answer: A

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6. An observer on the top of a cliff 200 m above the sea level, observes the angles of depression of two ships on opposite sides of the cliff to be $45°$ and $30°$ respectively. Then the distance between the ships if the line joining the points to the base of the cliff

A. $526 - 4m$

B. $5364m$

C. $54.6m$

D. None of these

Answer: D

7. The upper part of a tree broken over by the wind makes an angle of $30°$ with the ground and the distance from the root to the point where the top of the tree touches the ground is 10 m. The height of the tree is:

A. 17.3 m

B. 18.3 m

C. 16.3 m

D. None of these

Answer: A

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8. A tree is broken by wind, the upper part touches the ground at a point 10 m from the foot of the tree and makes an angle 45° with the ground. The entire length of the tree was

A. 15 m

B. 20 m

C. $10(\sqrt{2} - 1)m$

D. $10(\sqrt{2} + 1)m.$

Answer: D

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9. An aeroplane is 675 metres directly above one end of a bridge. The angle of depression of the other end of the bridge from the

acroplane is $56°40'$. The length of the hedge

is: (Given lan $56°40' = 1.5205$):

A. 424 m

B. 424 m

C. 444 m

D. None of these

Answer: C

10. The angles of elevation of the top of a tower observed by two observers i ng on a road, on the opposite sides of the tower are $30°$ and $60°$ respectively. If the observer and the tower are in the same vertical plane and the observers are 400 metres apart, then the height of the tower is:

A. $100\sqrt{3}$

B. $200\sqrt{3}$

C. $300\sqrt{3}$

D. None of these

Answer: A

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11. A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height.α Ata point on the plane the angle of elevation of the bottom of the flagstaff is a and that of the top of the flagstaff is β show that the height of the tower is:

A. $\dfrac{h \tan \beta}{\tan \beta - \tan \alpha}$

B. $\dfrac{h \tan \alpha}{\tan \beta - \tan \alpha}$

C. $\dfrac{h}{\tan \alpha - \tan \beta}$

D. None of these

Answer: B

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12. If p is the length of perpendicular from A to

BC in a $\triangle ABC$, then:

A. $p = \dfrac{a}{\cot B + \cot C}$

B. $h = -\dfrac{c}{\cot B - \cot C}$

C. $p = \dfrac{a \cot B}{\cot B + \cot c}$

D. None ot these

Answer: A

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13. The shadow of tower standing on a level plane is found to be 60 metres longer when the altitude of be san is 30∘ than when it is

45°.Then the height of the tower (in metres) is:

A. $20(\sqrt{3} + 1)$

B. $30(\sqrt{3} + 1)$

C. $10(\sqrt{3} + 1)$

D. None of these

Answer: B

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14. The angle of elevation of the top of a hill from each of the vertices A, B, C of a horizontal triangle is α. The height of the hill is :

A. $\dfrac{1}{2} a \tan \alpha \cos ecA$

B. $\dfrac{1}{2} c \tan \alpha \cos ecC$

C. $b \tan \alpha \cos ecB$

D. None of these

Answer: A

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15. The upper the portion of a vertical pole subcends an angle ta a point in the horizontal plane through its foot and advance 40 m from the foot. A possible height of the vertical pole is:

A. 40 m

B. 60 m

C. 80 m

D. 20 m.

Answer: A

16. A tower MPO surmounted by a spiral QR subiends on a horizontal plane. At the extremity A of a horizontal line AM It is found that MP and QR subtend equal angles. If MP=3m. PQ = 28m and OR $QR = 5m,$ then MA equals :

A. $\sqrt{36 \times 93}$

B. $\sqrt{18 \times 93}$

C. $\sqrt{34 \times 36}$

D. $\sqrt{34 \times 93}$.

Answer: B

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17. A town B is 13 km south and 18 km west of a town A. The bearing and distance of B from A are:

A. $S54°\,10, W35°, 22.\,2km$

B. $S45°, W35°, 12.2km$

C. $S30°$, $W60°$, $32.\,2km$

D. None of these

Answer: A

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18. At the foot of a mountain, the elevation of its summit is $45°$. After ascending 1000 m tounds the mountain up a slope of $30°$ inclination, the elevation is found 1o be $60°$. The height of the mountain is:

A. 1356 m

B. 1376 m

C. 1366 m

D. None of these

Answer: C

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19. The angle of clevation of the top Pof a vertical tower MP af heights from a point A in the horizontal plane is $45°$ and from a point

at a distance from Aom the line making an angle $30°$ with AM, it is $60°$, then:

A. $h = a(\sqrt{3} + 1)$

B. $h = a(\sqrt{3} - 1)$

C. $a = h(\sqrt{3} + 1)$

D. $a = h(\sqrt{3} - 1)$

Answer: D

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20. The angular elevation of the top of a vertical tower from a point in the same horizontal plane as the foot of the tower, is $58°$ and from a point B, in the same horizontal line with the love is the tower as A and 76 metres further away from it is $35°$. The height of the tower and the distance of the point A from the foot of the tower (Given $\tan 5 = 1.6$, $\tan 35° = 0$.

A. $94 - 4, 59$

B. $84.4. 59$

C. 94. 4, 49

D. None of these

Answer: A

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21. An aeroplane flying at a height of 3000 m above the ground passes vertically another place at an instant when the angle of elevation of the two planes from the same point on the ground are $60°$ and $45°$

respectively. The height of the lower plane from the ground is :

A. 500 m

B. 1000

C. $1000\sqrt{3}m$

D. $100\left(\sqrt{3}+1\right)m.$

Answer: C

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22. Two vertical lamp posts of equal heights stand on either side of a road 50 meters wide. At a point on the road, between the two lamp posts, the angles of elevation of the tops of the lamp posts are $60°$ and $30°$ Then the highest of each post and the position of the point from one pole are :

A. $21 - 65m, 12 - 5$

B. $21.65m, 20m$

C. $23m, 12.5m$

D. None of these.

Answer: A

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23. Two vertical poles 20 m and 80 m high stand apart on a horizontal plane. The height of the point of intersection of the lines joining the top of each pole to the foot of the other is:

A. 13 m

B. 14 m

C. 15 m

D. 16 m.

Answer: D

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24. Two flagstaffs stand on a horizontal plane. A and B are two points on the line joining their feet and between them. The angles of elevation of the tops of the flagstatts as seen

from A are $30°$ and $60°$ and as seen from B are $60°$ and 45^(@).` If AB=30 , then the distance between the flagstaffs in motres is:

A. $30 + 15\sqrt{3}$

B. $30 - 15\sqrt{3}$

C. $60 + 15\sqrt{3}$

D. $60 - 15\sqrt{3}.$

Answer: C

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25. A tower subtends an angle alpha at a point on the same level as the foot of the tower and at the second point h metres above the first the angle of depression of the base of a tower is beta The height of the tower

    A. $h \tan \alpha \cot \beta$

    B. $h \tan \beta \cot \alpha$

    C. $h \cot \beta \tan \alpha$

    D. None of these.

Answer: C

26. From the top of a lower the angles of depression of to ships on opposite sides of the tower are observed to be $30°$ and $45°$. If the height of the tower be 300 metics, then the distance between the ships if the line joining the ships passes through the foot of the tower

A. $300\left(\sqrt{3}+1\right)$

B. $200\left(\sqrt{3}+1\right)$

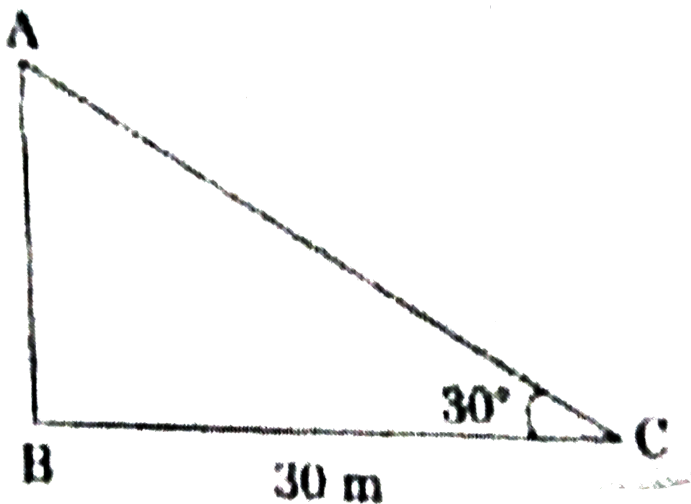C. $100\left(\sqrt{3} + 1\right)$

D. None of these

Answer: A

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27. The angle elevation of the top of a tower from a point C on the ground. Which is 30 m away from the foot of the tower is $30°$. Find

the height of the tower.

28. A tower is 60 m height. Its shadow is x metres shorter when the sun's altitude is $45°$ than when it has been $30°$, then x is equal to:

A. 41.92 m

B. 43.92 m

C. 43 m

D. 45.6 m

Answer: B

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29. AB is a vertical pole. The end A is on the level ground .C is the middle point of AB. P is a point on the level ground . The portion BC

subtends an angles β at P. If AP = nAB, then

tan β=

A. $\dfrac{n}{n^2 - 1}$

B. $\dfrac{n}{n^2 + 1}$

C. $\dfrac{n}{2n^2 + 1}$

D. None of these

Answer: C

30. The angle of elevation of the top of an incomplete vertical pillar at a horizontal distance of 50 m from its base is $45°$. If the angle of elevation of the top of the complete pillar the same point is to be $60°$,then the height of the incomplete pillar is to be increased by

    A. 50 m

    B. $25\sqrt{2}m$

    C. $50(\sqrt{3}-1)m$

D. $50(\sqrt{3} + 1)m.$

Answer: C

31. A sab, standing on the top of a pillar 25 m high subiends an angle whose tangentis 0 - 125 at a point 60 m from the foot of the pillar. The best approximation for the height of the status is:

A. $9.27m$

B. $0.28m$

C. $9.29m$

D. $9 - 30m.$

Answer: C

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32. Aman observes that the angle of elevation of the top of a tower from a point P on the ground is α.He moves a certain distance towards the foot of the tower and finds that

the age of elevation of the top has doubled. He further moves a distance $\frac{3}{4}$ of the previous and finds that the ele of elevation is three times that all. The angle is given by :

A. $\sin \alpha = \frac{3}{4}$

B. $\sin \alpha = \frac{3}{8}$

C. $\sin \alpha = \sqrt{\frac{5}{12}}$

D. $\cos \alpha = \sqrt{\frac{5}{12}}$.

Answer: C

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33. A flagstaff stands vertically on a pillar, the height of the flagstaff being double the height of the pillar. A man on the ground at a distance finds that both the pillar and the flagstaff subtend equal angles at his eyes. The ratio of the height of the pillar and the distance of the man from the pillar is

A. $1:3$

B. $1:\sqrt{3}$

C. $\sqrt{3}:1$

D. $\sqrt{3} : 2.$

Answer: B

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34. A balloon of radious r suntends an angleα at the eyes of an observer and the center of balloon from the eye is β. Find the ofcentre of the centre of the balloon from the eye of observer .

A. $r \sin \theta \sin \phi$

B. $\dfrac{r \sin \phi}{\sin \theta}$

C. $\dfrac{r \sin \theta}{\sin \phi / 2}$

D. $\dfrac{r \sin \phi}{\sin \theta / 2}$.

Answer: D

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35. A vertical pole subtends an angle $\tan^{-1}\left(\dfrac{1}{2}\right)$ at apoint P on the ground. The angle subtended by the upper half of the pole

at the point P is (A) $\tan^{-1}\left(\frac{1}{4}\right)$ (B) $\tan^{-1}\left(\frac{2}{9}\right)$ (C) $\tan^{-1}\left(\frac{1}{8}\right)$ (D) $\tan^{-1}\left(\frac{2}{3}\right)$

A. $\tan^{-1}\left(\frac{1}{4}\right)$

B. $\tan^{-1}\left(\frac{1}{8}\right)$

C. $\tan^{-1}\left(\frac{2}{3}\right)$

D. $\tan^{-1}\left(\frac{2}{9}\right)$.

Answer: D

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36. The angles of elevation of the top of two vertical towers as seen from the middle point of the line joining the feet of the towers are $60°$ and $30°$ respectively. The ratio of the height of the towers is

    A. $2:1$

    B. $3:1$

    C. $3:2$

    D. $\sqrt{3}:1$

Answer: B

37. A pole stands vertically inside a triangular

part △ABC If the angle of elevation of the top

of the pole from each comer of the part is the

same, then in △ ABC the foot of the pole is at

the :

A. centroid

B. circumentre

C. incentre

D. orthocentre.

Answer: B

38. A man from the top of a 100 metres high lower sees a car towards the tower at an angle of degression of $30°$. After some time, the angle of depression becomes $60°$. The distance metres travelled by the car during this time

A. $100\sqrt{3}m$

B. $\dfrac{200\sqrt{3}}{3}$

C. $\dfrac{100\sqrt{3}}{3}$

D. $200\sqrt{3}m.$

Answer: B

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39. A person standing on the bank of a river

observes that the angle of the top of a tree on

the opposite hank of the river is $60°$ and when

he retires 40 metres away from the tree the angle of elevation becomes $30°$. The breadth of the river is:

A. 20 m

B. 30 m

C. 40 m

D. 60 m.

Answer: A

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40. A tower stands at the centre of a circular park. A and B are two points on the boundary of the park such that AB (= a) subtends an angle of $60°$ at the face of the lower and the angle of elevation of the top of the tower from A or Bis $30°$. The height of the tower is:

A. $2a\sqrt{3}$

B. $\dfrac{a}{\sqrt{3}}$

C. $a\sqrt{3}$

D. $\dfrac{2a}{\sqrt{3}}$.

Answer: B

41. From the top and bottom of a building of height h metres, the angles of elevation of the top of a tower are α and β respectively. Then the height of the tower is :

A. $\dfrac{h \cos \alpha \sin \beta}{\sin(\beta - \alpha)}$

B. $\dfrac{h \cos \beta \sin \alpha}{\sin(\beta - \alpha)}$

C. $\dfrac{h \cos \alpha \sin \beta}{\sin(\beta + \alpha)}$

D. None of these

Answer: A

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42. At a distance d from the foot of tower AB of height h metres, a flagstaff BC (surmounted on the tower) and the tower subtend equal angles. Then the height of the flagstaff is :

A. $h = \dfrac{d^2 - h^2}{d^2 + h^2}$

B. $h \dfrac{d^2 + h^2}{d^2 - h^2}$

C. $\dfrac{d^2 + h^2}{d^2 - h^2}$

D. None of these

Answer: B

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43. A tower leans towards North. At two points due south of it and at distances a and b metres respectively from its foot, the angles of elevation of the top of the tower are found to

be a and B. If is the angle of inclination of the

tower to the horizontal, then cot O is equal to

:

A. $\dfrac{b \cot \alpha + a \cot \beta}{b + a}$

B. $\dfrac{b \cot \alpha - a \cot \beta}{b + a}$

C. $\dfrac{b \cot \alpha - a \cot \beta}{b - a}$

D. None of these

Answer: C

44. The angle of elevation of the top of a vertical tower from two points at distance a and b $(a > b)$ from the base and in the same line with it are complementary.Then the height of the tower is sqrt(ab), and if is the angle subtended at the top of the tower by the line joining these points, then sin is equal to :

A. $\dfrac{a+b}{a-b}$

B. $\dfrac{a-b}{a+b}$

C. $\dfrac{2(a+b)}{(a-b)}$

D. None of these

Answer: B

45. The angle of elevation of a cloud from a point h metres above the surface of a lake is α and the angle of depression of its reflection in the lake is β then the height is :

A. $\dfrac{h\sin(\alpha + \beta)}{\sin(\alpha - \beta)}$

B. $\dfrac{h\sin(\alpha + \beta)}{\sin(\beta - \alpha)}$

C. $\dfrac{h\sin(\beta - \alpha)}{\sin(\alpha + \beta)}$

D. None of these

Answer: A

46. A vertical pole PO stands at the centre of a square ABCD. If AC subtends an angle 90° at the top P of the pole, then the angle subtended by a side of the square at Pis:

A. 30°

B. $45°$

C. $60°$

D. None of these

Answer: C

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47. A vertical lamp-post, 6 m high stands at a distance of 2 m from a wall, 4 m high. A 105 m tall man starts to walk away from the wall on the other side of the wall, in line with the

lamp-post. The maximum distance to which the man can walk remaining in the shadow is :

A. $\dfrac{3}{2}m$

B. $\dfrac{5}{2}m$

C. $4m$

D. None of these

Answer: B

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1. A bird is sitting on the top of a vertical pole 20 m high and its elevation from a point O on the the ground is $45°$. If files off horizontally straight away from the point O. After one second, the elevation of the bird from O is reduced to $30°$. Then the speed (in m/s) of the bird is :

A. $40\left(\sqrt{3} - \sqrt{2}\right)$

B. $20\sqrt{2}$

C. $20\left(\sqrt{3} - 1\right)$

D. $40(\sqrt{2} - 1)$.

Answer: C

2. If the angles of elevation of the top of a tower from three colinear points A, B and C, on a line leading to the foot of the tower, are $30°$, $45°$ and $60°$ respectively, then the ratio, AB :BC, is :

A. $\sqrt{3} : 1$

B. $\sqrt{3} : \sqrt{2}$

C. $1 : \sqrt{3}$

D. $2 : 3$.

Answer: A

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1. The shadow of a tower standing on a level ground is x metres long when the sun's

altitude is $30°$, while it is y metres long when the altitude is $60°$. If the height of the tower is 45. $\dfrac{\sqrt{3}}{3}$ meters, then $x - y$ is :

A. 30 meters

B. $45\sqrt{3}$ meters

C. $\dfrac{45}{\sqrt{3}}$ meters

D. 45. $\dfrac{\sqrt{3}}{2}$ meters.

Answer: A

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