MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

HEIGHTS AND DISTANCES

Solved Examples Concept Based Single Correct Answer Type Questions

1. The angle of elevation of the top of two poles at a point on the line joining the foot of the towers on the ground is 45°. If the distance between the towers is 1m., the difference between the heights of the tower is

A. 2m

B. 1m

C. $1/2$ m

D. $3/2$ m

Answer: B

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2. Apoorv is standing in the centre of a rectangular park and observes that the angle of elevation of the top of a lamp post at a corner of the park in 60°. He then moves diagonally towards the opposite corner of the park and observes that the angle of elevation is now β, then the value of β is

A. 45°

B. 30°

C. $\tan^{-1}(\sqrt{3}/2)$

D. $\tan^{-1}(2/\sqrt{3})$

Answer: C

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3. A bird is sitting on the top of a vertical pole 20 m high and its elevation from a point O on the ground is 45°. It flies 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. $40(\sqrt{2}-1)$

B. $40(\sqrt{3}-\sqrt{2})$

C. $20\sqrt{2}$

D. $20(\sqrt{3}-1)$

Answer: D

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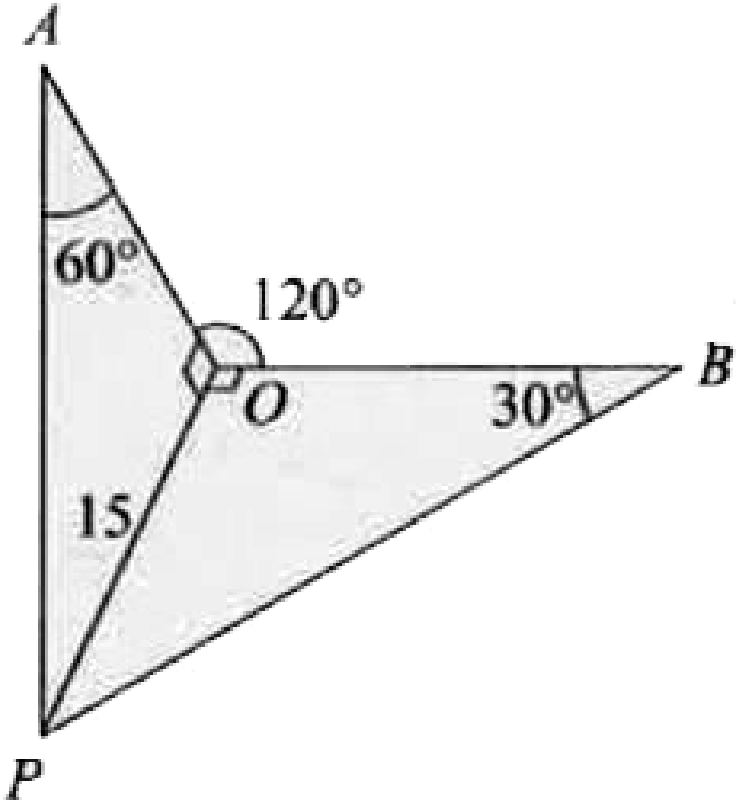
4. Two ships A and B are sailing straight away from the foot of a tower OP along routes such that $\underline{|AOB}$ is always 120°. At a certain instance, the angles of depression of the ships A and B from the top P of the towers are 60° and 30° respectively. The distance between the ships when the

height of the tower is 15m is



A. $5\sqrt{39}$ m

B. $5\sqrt{30}$ m

C. $5\sqrt{21}$ m

D. $5\sqrt{3}$ m

Answer: A

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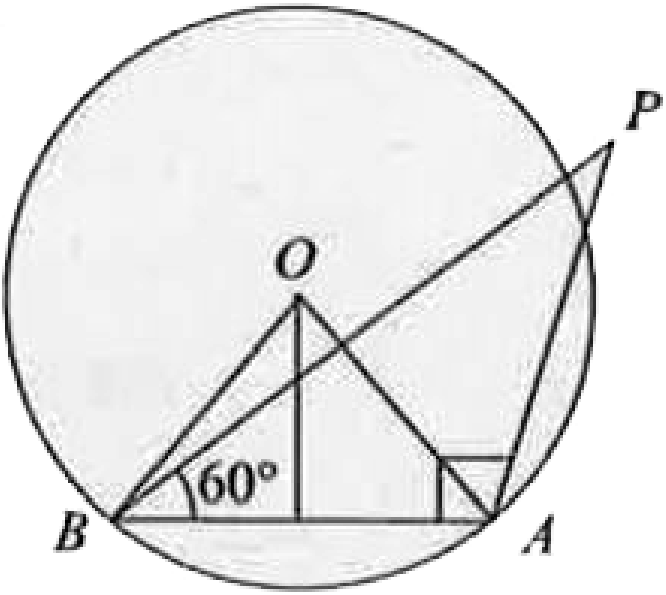
5. A vertical pole stands at a point A on the boundary of a circular park of radius 2 km and subtends an angle 60° at another point B on the boundary. If the chord AB subtends the same angle 60° at the centre of the park, the height of

the pole is



A. $2\sqrt{3}$ km

B. $\sqrt{3}$ km

C. $2/\sqrt{3}$ kmm

D. 1 km

Answer: A

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Solved Examples Level 1 Single Correct Answer Type Questions

1. A flagstaff stands in the centre of a rectangular field whose diagonal is 120 m. It subtends angles of 15° and 45° at the midpoints of the sides of the field. The height of the flagstaff is

A. 200 m

B. $300\sqrt{2+\sqrt{3}}$ m

C. $300\sqrt{2-\sqrt{3}}$ m

D. 400 m

Answer: C

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2. Two flagstaffs stand on a horizontal plane. A and B ar etwo points on the line joining their feet and between them. The angle of elevation of the tops of the flagstaffs as seen from A are 30° and 60° and as seen from B are 60° and 45°. If AB is 30 m, the distance between the flagstaffs in metres is

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

B. $45 + 15\sqrt{3}$

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

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

Answer: D

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3. In a cubicul hall $ABCDPQRS$ with each side $10m$, G is the centre of the walls $BCRQ$ and T is the midpoint of the side AB, the angle of elevation of G at the Point T is

A. $\sin^{-1}(1/\sqrt{3})$

B. $\cos^{-1}(1/\sqrt{3})$

C. $\tan^{-1}(1/\sqrt{3})$

D. $\cot^{-1}(1/\sqrt{3})$

Answer: A

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4. Two vertical poles of heights, 20 m and 80 m stand apart on a horizontal plane. The height (in m) of the point of intersection of the lines joining the top of each pole to the foot of the other, from this horizontal plane is

A. 15 m

B. 16 m

C. 18 m

D. 50 m

Answer: B

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5. A man from the top of a 100 metres high tower observes a car moving towards the tower at an angle of depression of 30°. After some time, the angle of depression becomes 60°. The distance (in metres) travelled by the car during this time is

A. $100\sqrt{3}$

B. $200 / \sqrt{3}$

C. $100 / \sqrt{3}$

D. $200\sqrt{3}$

Answer: B

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6. A pole stands vertically , inside a triangular park $\triangle ABC$. If the angle of elevation of the top of the pole from each corner of the park is same, then in $\triangle ABC$ the foot of the pole is at the

A. centroid

B. circumcentre

C. incentre

D. orthocentre

Answer: B

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7. A man observes that the angle of elevation of the top of a tower from a point P on the ground is θ. He moves a certain distance towards the foot of the tower and finds that the angle of elevation of the top has doubled. He further moves a distance 3/4 of the previous and finds that the angle of elevation is three times that at P. The angle θ is given by

A. $\sin\theta = \sqrt{5/12}$

B. $\cos\theta = \sqrt{5/12}$

C. $\sin\theta = 3/4$

D. $\cos\theta = 3/8$

Answer: A

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8. A vertical pole subtends an angle $\tan^{-1}\left(\frac{1}{2}\right)$ 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. $\tan^{-1}(1/4)$

B. $\tan^{-1}(2/9)$

C. $\tan^{-1}(1/8)$

D. $\tan^{-1}(2/3)$

Answer: B

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9. An aeroplane flying at a height 300 metre above the ground passes vertically above another plane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Then the height of the lower plane from the ground in metres is

A. $100\sqrt{3}$ m

B. $100/\sqrt{3}$ m

C. 50 m

D. $150\left(\sqrt{3}+1\right)$ m

Answer: A

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10. A pole of height h stands at one corner of a park of the shape of an equilateral triangle. If α is the angle which the pole subtends at the mid point of the opposite side, the length of each side of the park is

A. $\left(\sqrt{3}/2\right)h\cot\alpha$

B. $\left(2/\sqrt{3}\right)h\cot\alpha$

C. $\left(\sqrt{3}/2\right)h\tan\alpha$

D. $\left(2/\sqrt{3}\right)h\tan\alpha$

Answer: B

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11. Each side of an equilateral triangle subtends an angle of 60° at the top of a tower hm high located at the centre of the triangle. It a is the length of each side of the triangle, then prove that $2a^2 = 3h^2$.

A. $3a^2 = 2h^2$

B. $2a^2 = 3h^2$

C. $a^2 = 3h^2$

D. $3a^2 = h^2$

Answer: B

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12. A pole of 50 meter high stands on a building 250 m high. To an observer at a height of 300 m, thebuilding and the pole subtend equal angles. The distance of the observer from the top of The pole

A. 25 m

B. 50 m

C. $25\sqrt{6}$ m

D. $25\sqrt{3}$ m

Answer: C

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13. Two vertical poles of height a and b subtend the same angle 45° at a point on the line joining their feet, the square of the distance between their tops is

A. $(1/2)\left(a^2+b^2\right)$

B. a^2+b^2

C. $2\left(a^2+b^2\right)$

D. $(a+b)^2$

Answer: C

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14. A monument ABCD stands at A on a level ground. At a point P on the ground the portions AB, AC, AD subtend

α, β, γ respectivelyl. If AB = a, AC = b, AD = c, AP = x and $\alpha + \beta + \gamma = 180^\circ$ then x^2 is equal to

A. $\frac{a}{a+b+c}$

B. $\frac{b}{a+b+c}$

C. $\frac{c}{a+b+c}$

D. $\frac{abc}{a+b+c}$

Answer: D

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15. A vertical tower CP subtends the same angle θ, at point B on the horizontal plane through C, the foot of the tower, and at point A in the vertical plane. If the triangle ABC is

equilateral with length of each side equal to 4 m, the height of the tower is

A. $8\sqrt{3}$ m

B. $4\sqrt{3}/3$ m

C. $4\sqrt{3}$ m

D. $8/\sqrt{3}$ m

Answer: B

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16. A man on the ground observes that the angle of elevation of the top of a tower is 68° 11', and a flagstaff 24 m high on the summit of the tower subtends an angle of 2°

10' at the observer's eye. If $\tan 70^\circ$ 21' = 2.8 and $\cot 68^\circ$ 11' = 0.4, the height of the tower is

A. 120 m

B. 168 m

C. 200 m

D. 300 m

Answer: C

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17. A statue, standing on the top of a pillar 25 m high, subtends an angle whose tangent is 0.125 at a point 60 m

from the foot of the pillar. The best approximation for the height of the statue is

A. 9.28 m

B. 9.29 m

C. 9.30 m

D. 10 m

Answer: B

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18. A tower BCD surmounted by a spire DE stands on a horizontal plane. At the extremity A of a horizontal line BA it

is found that BC and DE subtend equal angles. If BC = 3 m, CD = 28 m and DE = 5 m, then BA is equal to

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

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

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

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

Answer: A

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19. A lamp post standing at a point A on a circular path of radius r subtends an angle α at some point B on the path,

and AB subtends an angle of 45° at any other point on the path, then height of the lampost is

A. $\sqrt{2}r \cot \alpha$

B. $\left(r / \sqrt{2}\right) \tan \alpha$

C. $\sqrt{2}r \tan \alpha$

D. $\left(r / \sqrt{2}\right) \cot \alpha$

Answer: C

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20. A tree is broken by wind, its upper part touches the ground at a point 10 metres from the foot of the tree and

makes an angle of 45° with the ground . The entire length of the tree is

A. 15 m

B. 20 m

C. $10\left(\sqrt{2}+1\right)$ m

D. $5\left(\sqrt{3}+2\right)$ m

Answer: C

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21. From the top of a cliff of height a, the angle of depression of the foot of a certain tower is found to be double the angle of elevation of the top of the tower of

height h. If θ be the angle of elevation, then prove that $\tan\theta = \sqrt{3 - \frac{2h}{a}}$.

A. $\sin^{-1}\sqrt{x/(2-h)}$

B. $\tan^{-1}\sqrt{3 - 2h/x}$

C. $\sin^{-1}\sqrt{2h/x}$

D. $\cos^{-1}\sqrt{2h/x}$

Answer: B

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22. A river flows due North, and a tower stands on its left bank. From a point A upstream and on the same bank as the tower, the elevation of the tower is 60°, and from a point B

just opposite A on the other bank the elevation is 45°. If the tower is 360 m high, the breadth of the river is

A. $120\sqrt{6}$ m

B. $240/\sqrt{3}$ m

C. $240\sqrt{3}$ m

D. $240\sqrt{6}$ m

Answer: A

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23. From a point a metres above a lake the angle of elevation of a cloud is α and the angle of depression of its

reflection is β. Prove tha the height of the cloud is

$\frac{a\sin(\alpha+\beta)}{\sin(\beta-\alpha)}$ metres.

A. $\frac{h(\cot\alpha+\cot\beta)}{\cot\beta-\cot\alpha}$

B. $\frac{h(\tan\alpha-\tan\beta)}{\tan\alpha+\tan\beta}$

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

D. $\frac{h\sin(\alpha-\beta)}{\sin(\alpha+\beta)}$

Answer: C

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24. 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. $\frac{r \sin \beta}{\sin \alpha}$

B. $r \sin b \sin a$

C. $\frac{r \sin \beta}{\sin(\alpha / 2)}$

D. $\frac{r \sin \alpha}{\sin(\beta / 2)}$

Answer: C

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25. Two poles of height a and b stand at the centers of two circular plots which touch each other externally at a point and the two poles subtend angles of 30° and 60°

respectively at this point, then distance between the centers of these plots is

A. a + b

B. $(3a + b) / \sqrt{3}$

C. $(a + 3b) / \sqrt{3}$

D. $a\sqrt{3} + b$

Answer: B

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26. A tower is standing in the centre of an elliptic field. If Adya observes that the angle of elevation of the top of the

tower at an extremity of the major axis of the field is α, at its focus is β and an extremity of the minor axis is γ, then

A. $\cot^2\alpha = \cot^2\beta - \cot^2\gamma$

B. $\cot^2\beta = \cot^2\gamma - \cot^2\alpha$

C. $\cot^2\gamma = \cot^2\alpha - \cot^2\beta$

D. None of these

Answer: C

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27. A tower of height h stands at a point O on the ground. Two poles of height a and b stand at the points A and B respectively such that O lies on the line joining A and B. If

the angle of elevation of the top of the tower at the foot of one pole is ame as at the top of the other pole, then h is equal to

A. $\frac{a+b}{ab}$

B. $\frac{ab}{a+b}$

C. a + b

D. $\frac{a+b}{|a-b|}$

Answer: B

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28. Rajat observes that the angle of elevation of the first floor of a building at a point A on the ground is 30°. He

moves $\sqrt{3}$ units towards the building to the point B and finds that the angle of elevation of the second floor of the building is 60°. If each floor has the same height, height of the 7th floor from the ground in units is

A. 5

B. 7

C. 21

D. 35

Answer: C

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29. A pole of height h stands in the centre of a circular platform in the centre of a circular field. Another pole of equal height is at a point on the boundary of the field. The angles of elevation of the top of the first pole from the bottom and top of the second pole are respectively α and β. Height of the platform from the ground is

A. $\frac{h\cot\alpha}{\cot\beta-\cot\alpha}$

B. $\frac{h\cot\beta}{\cot\alpha-\cot\beta}$

C. $\cot\alpha-\cot\beta$

D. None of these

Answer: A

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30. The tangents of the angles subtended by a tower at four points A, B, C and D on the ground are in H.P. If O be the foot of the tower on the ground, then

A. $OA + OC = OB + OD$

B. $OA + OB = OC + OD$

C. $OA + OD = OB + OC$

D. $AB + CD = BC + CD$

Answer: C

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Solved Examples Level 2 Single Correct Answer Type Questions

1. A and B are two points 30 m apart in a line on thehorizontal plane through the foot of a tower lyingon opposite sides of the tower. If the distance of thetop of the tower from A and B are 20 m and 15 mrespectively, the angle of elevation of the top ofthe tower at A is-

A. $\cos^{-1}(43/48)$

B. $\sin^{-1}(43/48)$

C. $\cos^{-1}(29/36)$

D. $\sin^{-1}(29/36)$

Answer: A

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2. The angle of elevation of the top C of a vertical tower CD of height h from a point A in the horizontal plane is 45° and from a point B at a distance a from A on the line making an angle 30° with AD, it is 60°, then

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

B. $h = a\left(\sqrt{3}+1\right)$

C. $a = h\left(\sqrt{3}-1\right)$

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

Answer: C

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3. The angles of elevation of a vertical tower standing inside a triangular field at the vertices of the field are each equal to θ. If the length of the sides of the field are 30 m, 50 m and 70 m, the height of the tower is

A. $\left(70\sqrt{3}\right)\tan\theta m$

B. $\left(70/\sqrt{3}\right)\tan\theta m$

C. $\left(50/\sqrt{3}\right)\tan\theta m$

D. $\left(75\sqrt{3}\right)\tan\theta m$

Answer: B

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4. In a triangular plot ABC with BC = 7 m, CA = 8 m and AB = 9 m. A lamp post is situated at the midle point E of the side AC and subtends an angle $\tan^{-1} 3$ at the point B, the height of the lamp post is

A. 21 m

B. 24 m

C. 27 m

D. cannot be determined

Answer: A

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5. Two objects at the points P and Q subtend an angle of 30° at a point A. Lengths AR = 20 m and AS = 10 m are measured from A at right angles to AP and AQ respectively. If PQ subtends equal angle of 30°, at R and S, then length of PQ is

A. $\sqrt{300 - 200\sqrt{3}}$

B. $\sqrt{500 - 200\sqrt{3}}$

C. $\sqrt{500\sqrt{3} - 200}$

D. $\sqrt{300}$

Answer: B

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6. From a ship at sea it is observed that the angle subtended by feet A and B of two light houses, at the ship is 30°. The ship sails 4 km towards A and this angle is then 48°, the distance of B from the ship at the second observation is

A. 6.460 km

B. 6.472 km

C. 6.476 km

D. 6.478 km

Answer: B

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7. From a point on the horizontal plane, the elevation of the top of a hill is 45°. After walking 500 m towards its summit up a slope inclined at an angle of 15° to the horizon the elevation is 75°, the height of the hill is

A. $500\sqrt{6}$ m

B. $500\sqrt{3}$ m

C. $250\sqrt{6}$ m

D. $250\sqrt{3}$ m

Answer: C

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8. The elevation of a steeple at a place due south of it is 45° and at a place B due west of A the elevation is 15°. If AB = 2a, the height of the steeple is

A. $a\dfrac{\left(\sqrt{3}-1\right)}{\sqrt{2}}$

B. $a\dfrac{\left(\sqrt{3}+1\right)}{\sqrt{2}}$

C. $a\left[3^{\frac{1}{4}}-3^{-\frac{1}{4}}\right]$

D. $a\left[3^{\frac{1}{4}}+3^{-\frac{1}{4}}\right]$

Answer: C

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9. The top of a pole, placed against a wall at an angle α with the horizon, just touches the coping, and when its foot is moved a m, away from the wall and its angle of inclination is β, it rests on the sill of a window, the vertical distance of the sill from the coping is

A. $a\sin((\alpha+\beta)/2)$

B. $a\cos((\alpha+\beta)/2)$

C. $a\cot((\alpha+\beta)/2)$

D. $a\tan((\alpha+\beta)/2)$

Answer: C

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10. OAB is a triangle in the horizontal plane through the foot P of the tower at the middle point of the side OB of the triangle. If $OA = 2m, OB = 6m, AB = 5m$ and $\angle AOB$ is equal to the angle subtended by the tower at A, then the height of the tower is

A. $\sqrt{\frac{11 \times 39}{25 \times 3}}$

B. $\sqrt{\frac{11 \times 39}{25 \times 2}}$

C. $\sqrt{\frac{11 \times 25}{39 \times 2}}$

D. None of these

Answer: B

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11. If two vertical towers PQ and RS of lengths a and b $(a > b)$ respectively subtend the same angle α at a point A on the line joining their feet P and R in the horizontal plane and angles β and γ at another point B on this line nearer the towers on the same side of the towers as A, then $\frac{\sin(\beta-\gamma)}{\sin(\beta-\alpha)}$ is equal to

A. $\frac{b\sin\alpha}{(a-b)\sin\gamma}$

B. $\frac{(b-a)\sin\gamma}{b\sin\alpha}$

C. $\frac{\sin\gamma}{\sin\alpha}$

D. $\frac{(b-a)\sin\alpha}{b\sin\gamma}$

Answer: B

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12. A person standing on the ground observes the angle of elevation of the top of a tower to be 30° On walking a distance a in a certain direction, he finds the elevation of the top to be same as before. He then walks a distance $\frac{5}{3}a$ at right angles to his former direction, and finds that the elevation of the top has doubled. The height of the tower is

A. a

B. $\sqrt{85/48}$ a

C. $\sqrt{6/5}$ a

D. $\sqrt{48/85}$ a

Answer: B

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13. A tower PQ subtends an angle α at a point A on the same level as the foot Q of the tower. It also subtends the same angle α at a point B where AB subtends the angle α with AP then

A. AB = BQ

B. BQ = 2AQ

C. $\frac{AB}{BQ} = (1/2)\sin\alpha$

D. $\frac{AB}{BQ} = (1/2)\text{cosec}\alpha$

Answer: D

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14. The angle of elevation of the top of a tree at a point B due south of it is 60° and at a point C due north of it is 30°. D is a point due north of C where the angle of elevation is 15°, then given $\sqrt{3} = 1\frac{8}{11}$ and $BC \times CD = 2^3 \times 3^2 \times 19 \times 11$, the height of the tree is

A. 33

B. 38

C. 57

D. 88

Answer: C

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15. n poles standing at equal distances on a straight road subtend the same angle α at a point O on the road. If the height of the largest pole is h and the distance of the foot of the smallest pole from O is a, the distance between two consecutive poles is

A. $\frac{h\sin\alpha - a\cos\alpha}{(n-1)\sin\alpha}$

B. $\frac{h\cos\alpha - a\cos\alpha}{(n-1)\cos\alpha}$

C. $\frac{h\cos\alpha - a\sin\alpha}{(n-1)\sin\alpha}$

D. $\frac{h\sin\alpha - a\cos\alpha}{(n-1)\cos\alpha}$

Answer: C

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Solved Examples Numerical Answer Type Questions

1. The angle of elevation of a tower at a point d meter away from its base is 30°. If the tower is 15 m high, then 3d = _____ m

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2. A portion of a 24 m high tree is broken by tornado and struck the ground making an angle of 30° with the ground. The height of the point where the tree is broken is equal to _____ m

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3. A person standing on the bank of a river observes that the angle subtended by a tree on the opposite of bank is 60°. When he retires 40 m.from the bank, he finds the angle to be 30°. What is the breadth of the river ?

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4. A tower subtends angles, $\alpha, 2\alpha, 3\alpha$ respectively at points A, B and C all lying on a horizontal line through the foot of the tower. If $0 < \alpha < \frac{\pi}{6}$ and $\frac{AB}{BC} = 8\cos^2\alpha - 2k$, then k = _____

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5. The lengths of the shadow of a vertical pole of height h thrown by the sun's rays at three different moments are h, 2h and 3h. The sum of the angles of elevations of the rays at these moments is equal to $\frac{\pi}{4k}$ where k = _____

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Exercise Concept Based Single Correct Answer Type Questions

1. A pole is standing at a point O between two milestones at A and B such that the angles of elevation of the top of the pole at A and B are respectively α and β. If the distance between the milestones is half the height of the pole then

A. $2\sin(\alpha+\beta) = \sin\alpha\sin\beta$

B. $2\sin(\alpha+\beta)=\cos\alpha\cos\beta$

C. $\sin(\alpha+\beta)=2\sin\alpha\sin\beta$

D. $\sin(\alpha+\beta)=2\cos\alpha\cos\beta$

Answer: A

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2. OP is a tower of height 20 m and AB is a pole of height 5 m. The angle of elevation of the top P of the tower from the top B of the pole is 45°. Both pole and tower stand on the same ground. The angle of elevation of the top P of the tower from the base A of the pole is

A. $\cos^{-1}\frac{3}{5}$

B. $\sin^{-1}\frac{3}{5}$

C. $\tan^{-1}\frac{3}{4}$

D. $\cot^{-1}\frac{3}{4}$

Answer: A

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3. A circular path is 50 m. wide. The angle of elevation of the top of a pole at the centre of the circular park at a point on the outer circle is 45°. The height of the pole is

A. $\frac{50\cos\alpha}{\cos\alpha-\sin\alpha}$

B. $\frac{50\sin\alpha}{\sin\alpha-\cos\alpha}$

C. $\frac{50}{\cos\alpha-\sin\alpha}$

D. $\frac{50}{\cos\alpha + \sin\alpha}$

Answer: B

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4. A pole 10 m high stands on a tower 30 m. high. The angle of elevation of the top of the pole at a point A on the ground in 45° and the pole subtends an angle α at the same point A then α is equal to (with each side equal to 100 m.)

A. $\cot^{-1}(1/7)$

B. $\cot^{-1}7$

C. $\cos^{-1}(1/7)$

D. $\sin^{-1}(1/7)$

Answer: B

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5. ABCD is a square field with each side equal to 100 m. Two poles of equal heights stand at E, the mid point of DC and at the corner B of the field, subtending respectively angles α and 30° at the corner A of the field. The value of α satisfies

A. $\cos 2\alpha = \frac{11}{19}$

B. $\sin 2\alpha = \frac{15}{19}$

C. $\tan 2\alpha = \frac{4}{19}$

D. $\tan 2\alpha = \frac{19}{15}$

Answer: A

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Exercise Level 1 Single Correct Answer Type Questions

1. The angle of elevation of the top of an incomplete vertical pillar at a horizontal distance of 100 m from its base is 45°. If the angle of elevation of the top of the complete pillar at the same point is to be 60°, then the height of the incomplete pillar is to be increased by

A. $50\sqrt{3}$

B. $100\sqrt{2}$

C. $100\sqrt{3}$

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

Answer: D

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2. The angles of elevation of the top of a tower at the top and the foot of a pole 10 m high are 30° and 60° respectively. The height of the tower is

A. 15 m

B. 20 m

C. $10\sqrt{3}$ m

D. $25\sqrt{3}$ m

Answer: A

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3. A tower subtends an angle α at a point A in the plane of its base and the angle of depression of the foot of the tower at a point b ft just above A is β. Then the height of the tower is

A. $b\tan\alpha\tan\beta$

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

C. $b\cot\alpha\cot\beta$

D. $b\cot\alpha\tan\beta$

Answer: B

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4. A person walking along a straight road observes that a two points 1 km apart, the angles of eleva-tion of a pole in front of him are 30° and 75°. The height of the pole is

A. $250\left(\sqrt{3}+1\right)$ m

B. $250\left(\sqrt{3}-1\right)$ m

C. $500\left(\sqrt{2}+1\right)$ m

D. $500\left(\sqrt{2}-1\right)$ m

Answer: A

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5. If a flagstaff subtends the same angle at the points A, B, C and D on the horizontal plane through its foot, then ABCD is a

A. square

B. cyclic quadrilateral

C. rectangle

D. None of these

Answer: B

View Text Solution

6. From a point on the ground 100 m away from the base of a building, the angle of elevation of the top of the building is 60°. Which of the following is the best approximation for the height of the building ?

A. 172 m

B. 173 m

C. 174 m

D. 175 m

Answer: B

View Text Solution

7. From the top of a tower 100 m heigh, the angles of depression of two objects 200 m apart on the horizontal plane and in a line passing through the foot of the tower and on the same side of the tower are $45^\circ - A$ and $45^\circ + A$, then angle A is equal to

A. 15°

B. 22.5°

C. 30°

D. 35°

Answer: B

View Text Solution

8. An observer finds that the angular elevation of a tower is θ. On advancing 3m towards the tower, the elevation is 45° and on advancing 2m further more towards the tower, the elevation is $90^\circ - \theta$. The height of the tower is (assume the height of observer is negligible and observer lies on the same level as the foot of the tower)

A. 1m

B. 5m

C. 6m

D. 8m

Answer: C

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9. ABC is a triangular park with all sides equal. If a pillar at A subtends an angle of 45° at C, the angle of elevation of the pillar at D, the middle point of BC is

A. $\tan^{-1}(\sqrt{3}/2)$

B. $\tan^{-1}(2/\sqrt{3})$

C. $\cot^{-1}\sqrt{3}$

D. $\tan^{-1}\sqrt{3}$

Answer: B

View Text Solution

10. A kite is flying with the string inclined at 75° to the horizon. If the length of the string is 25 m, the height of the

kite is

A. $(25/2)\left(\sqrt{3}-1\right)^2$

B. $(25/4)\left(\sqrt{3}+1\right)\sqrt{2}$

C. $(25/2)\left(\sqrt{3}+1\right)^2$

D. $(25/2)\left(\sqrt{6}+\sqrt{2}\right)$

Answer: B

View Text Solution

11. 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. $\frac{n}{2n^2+1}$

B. $\frac{n}{n^2-1}$

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

D. None of these

Answer: A

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12. A man in a boat rowed away from a cliff 150 m high takes 2 min, to change the angle from 60° to 45°. The speed of the boat is

A. $(1/2)\left(9-3\sqrt{3}\right)$ km/h

B. $(1/2)\left(9+3\sqrt{3}\right)$ km/h

C. $(1/2)\left(9\sqrt{3}\right)$ km/h

D. None of these

Answer: A

Watch Video Solution

13. A person standing on the bank of a river observes that the angle subtended by a tree on the opposite of bank is 60°. When he retires 40 m.from the bank, he finds the angle to be 30°. What is the breadth of the river ?

A. 40 m

B. 60 m

C. 20 m

D. 30 m

Answer: C

Watch Video Solution

14. The elevation of the top of a mountain at each of the three angular points A, B and C of a plane horizontal triangle is α, if BC = a the height of the mountain is

A. $(a/2)\text{cosec A tan}\alpha$

B. $(a/2)\sec A\tan\alpha$

C. $(a/2)\text{cosec}\alpha\cot A$

D. $(a/2)\sec\alpha\tan A$

Answer: A

View Text Solution

15. The angles of elevation of the top of a tower standing on a horizontal plane, from two points on a line passing through its foot at distances a and b, respectively, are complementary angles. If the line joining the two points subtends an angle θ at the top of the tower, then if $a > b$, $\sin\theta$ =

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

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

C. $\frac{2\sqrt{ab}}{a+b}$

D. $\frac{2\sqrt{ab}}{a-b}$

Answer: A

View Text Solution

16. The upper three-quarters of a vertical pole subtends an angle $\tan^{-1}(3/5)$ at a point in the horizontal plane through its foot and distant 40 m from it. The height of the pole is

A. 80 m

B. 100 m

C. 160 m

D. 200 m

Answer: C

View Text Solution

17. PQ is a vertical tower and A, B, C are three points on a horizontal line through Q, the foot of the tower and on the same side of the tower. If the angles of elevation of the top of the tower from A, B and C are α, β, γ respectively, then AB/BC =

A. $\frac{\cot\alpha - \cot\gamma}{\cot\beta - \cot\gamma}$

B. $\frac{\cot\alpha - \cot\beta}{\cot\beta - \cot\gamma}$

C. $\frac{\cot\alpha - \cot\beta}{\cot\alpha - \cot\gamma}$

D. $\frac{\cot\alpha - \cot\gamma}{\cot\alpha - \cot\beta}$

Answer: B

View Text Solution

18. ABCD is a rectangular park with AB = a. A tower standing at C makes angles α and β at A and B respectively, the height of the tower is

A. $\frac{a}{\sqrt{\cot^2\alpha + \cot^2\beta}}$

B. $\frac{a}{\sqrt{\cot^2\alpha - \cot^2\beta}}$

C. $\frac{a\tan\alpha\tan\beta}{\sqrt{\tan^2\beta + \tan^2\alpha}}$

D. $\frac{a\cot\alpha\cot\beta}{\sqrt{\cot^2\alpha - \cot^2\beta}}$

Answer: B

View Text Solution

19. Two circular path of radii a and b intersect at a point O and AB is a line through O meeting the circles at A and B respectively. Chords OA and OB subtend equal angles of 60° at their respective centres. A vertical pole at O subtends angles α and β respectively at A and B then height of the pole is

A. $a \cot \alpha$

B. $b \cot \beta$

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

D. None of these

Answer: C

View Text Solution

20. Three poles of height a, b, c stand on the same side of a road and subtend an angle of 45° at a point on the line joining their feet. The pole of height a subtends an angle α at the foot of the pole of height b which subtends an angle β at the foot of the pole with height c, if $a > b > c$, then $\cot\alpha - \cot\beta$ =

A. $\frac{ac - b^2}{ab}$

B. $\frac{bc - a^2}{ab}$

C. $\frac{ab - c^2}{bc}$

D. $\frac{ac - b^2}{bc}$

Answer: A

View Text Solution

21. An aeroplane flying horizontally 1 km above the ground is observed at an elevation of 60°. If after 10 seconds, the elevation is observed to be 30°, then the uniform speed of the aeroplane per hour is

A. 120 km

B. 240 km

C. $240\sqrt{3}$ km

D. $240/\sqrt{3}$ km

Answer: C

View Text Solution

22. If a flagstaff 6 metres high placed on the top of a tower throws a shadow of $2\sqrt{3}$ metres along the ground then the angle (in degrees) that the sun makes with the ground is

A. 15°

B. 30°

C. 60°

D. $\tan^{-1} 2\sqrt{3}$

Answer: C

View Text Solution

23. Three poles whose feet lie on a circle subtend angle α, β, γ respectively at the centre of the circle. If the height

of the poles are in A.P. then $\cot\alpha, \cot\beta, \cot\gamma$ are in

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: C

View Text Solution

24. A, B, C are three points on a vertical pole whose distances from the foot of the pole are in A.P. and whose angles of elevation at a point on the ground are

α, β and γ respectively. If $\alpha + \beta + \gamma = \pi$, then $\tan\alpha \tan\gamma$ is equal to

A. 3

B. 2

C. 1

D. -1

Answer: A

View Text Solution

25. A ladder rests against a wall at an angle of 35°. Its foot is pulled away through a distance a, so that it slides a

distance b down the wall, finally making an angle of 25° with the horizontal, then a/b =

A. 1

B. $1/\sqrt{3}$

C. $\sqrt{3}$

D. $\sqrt{3}/2$

Answer: B

View Text Solution

Exercise Level 2 Single Correct Answer Type Questions

1. The angle of elevation of the top Q of a tower PQ at a point A on the horizontal plane through P the foot of the tower is α. At a point B on AQ at a vertical height of a, the angle of elevation of the middle point R of the tower PQ is β, then the height of the tower is

A. $\frac{2a(\tan\alpha - \tan\beta)}{\tan\alpha - 2\tan\beta}$

B. $\frac{2a(\tan\alpha - 2\tan\beta)}{\tan\alpha - \tan\beta}$

C. $\frac{2(\tan\alpha\tan\beta - 1)}{2\tan\alpha\cot\beta - 1}$

D. $\frac{2a(\tan\alpha\cot\beta - 1)}{2\tan\alpha\cot\beta - 1}$

Answer: A

View Text Solution

2. A lamppost stands in the centre of a circular garden and makes angle α at point A and B on the boundary where AB subtends an angle 2β at the foot of the lamppost. If γ is the angle which the lamppost subtends at C, the middle point of the line joining A and B, then $\tan\gamma$ =

A. $\tan\alpha\tan\beta$

B. $\sec\alpha\tan\beta$

C. $\tan\alpha\sec\beta$

D. None of these

Answer: C

View Text Solution

3. From a point on the ground, if the angles of elevation of a bird flying at constant speed in a horizontal direction, measured at equal intervals of time are α, β, γ and δ, then

A. $\cot^2\beta - \cot^2\gamma = 3\left(\cot^2\alpha - \cot^2\delta\right)$

B. $\cot^2\beta - \cot^2\delta = 3\left(\cot^2\alpha - \cot^2\gamma\right)$

C. $\cot^2\gamma - \cot^2\delta = 3\left(\cot^2\alpha - \cot^2\beta\right)$

D. $\cot^2\alpha - \cot^2\delta = 3\left(\cot^2\beta - \cot^2\gamma\right)$

Answer: D

View Text Solution

4. A vertical tower standing at O has marks P, Q, R, S at heights of 1m, 2m, 3m and 4m from the foot O and A is a

point on the horizontal plane through O. If PQ and RS subtend angles α and β respectively at A where OA = 2m then $\cos(\alpha+\beta)$ =

A. $5/\sqrt{26}$

B. $24/\sqrt{650}$

C. $23/\sqrt{650}$

D. $1/\sqrt{26}$

Answer: C

View Text Solution

5. ABCD is a rectangular field with AB = a and BC = b. A lamp post of height h at A subtends an angle α at P, the middle

point of CD and another lamp post of equal heigh at D subtends an angle β at Q, the middle point of BC. If PQ subtends an angle θ at A, then $\cot^2\alpha\cot^2\beta\cos^2\theta = k^2$, where k =

A. $\left(a^2+b^2\right)/2h^2$

B. $\left(a^2-b^2\right)/2h^2$

C. $2h^2/\left(a^2+b^2\right)$

D. $2\left(a^2+b^2\right)h^2$

Answer: A

View Text Solution

6. A vertical tower OP of height h subtends angle α, β, γ respectively at the point A, B, C on the horizontal plane through the foot O of the tower. A is due west of the tower. B is due east of A and on the same side of the tower as A. C is due south of B, then AC =

A. $h(\cot\alpha - \cot\beta)$

B. $h\sqrt{\cot^2\gamma - \cot^2\beta}$

C. $h\sqrt{\cot^2\alpha + \cot^2\gamma - 2\cot\alpha\cot\beta}$

D. $h\sqrt{\cot^2\gamma + \cot^2\beta - 2\cot\alpha\cot\beta}$

Answer: C

View Text Solution

7. PQ and RS are two vertical towers of the same height where S is on the ground Q is above the ground. The line joining the top P and the foot S of the two towers meets the horizontal line through Q at a point A where the angles of elevation of the tops P and R of the two towers are α and β respectively. If AS = a, the height of the towers is

A. $\frac{a\sin(\beta+\alpha)}{\cos\beta}$

B. $\frac{a\cos(\beta+\alpha)}{\cos\beta}$

C. $\frac{a\sin(\beta+\alpha)}{\sin\beta}$

D. $\frac{a\cos(\beta+\alpha)}{\sin\beta}$

Answer: A

View Text Solution

8. From the top of a building of height h, a tower standing on the ground is observed to make an angle θ. If the horizontal distance between the building and the tower is h, the height of the tower is

A. $\frac{2h\cos\theta}{\sin\theta+\cos\theta}$

B. $\frac{2h}{1+\cot\theta}$

C. $\frac{2h}{1+\tan\theta}$

D. $\frac{2h}{\sin\theta+\cos\theta}$

Answer: B

View Text Solution

9. A tower stands at the foot of a hill whose inclination to the horizon is 9°, at a point 40 m up the hill the tower subtends an angle of 54°. The height of the tower is

A. 17.56 m

B. 45.76 m

C. 54.76 m

D. None of these

Answer: B

View Text Solution

10. The angle of elevation of a stationery cloud from a point 2500 m above a lake is $15o$ and the angle of depression of

its reflection in the lake is $45o$. What is the height of the cloud above the lake level? (Use $\tan 15o = 0.268$)

A. $2500/\sqrt{3}$ m

B. 2500 m

C. $2500\sqrt{3}$ m

D. $5000\sqrt{3}$ m

Answer: C

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11. A tower PQ stands at a point P within the triangular park ABC such that the sides $a, bandc$ of the triangle subtend equal angles at P, the foot of the tower. if the

tower subtends angles $\alpha, \beta and \gamma, at A, B and C$ respectively, then prove that $a^2(\cot\beta - \cot\gamma) + b^2(\cot\gamma - \cot\alpha) + a^2(\cot\alpha - \cot\beta) = 0$

A. -1

B. 0

C. 1

D. a + b + c

Answer: B

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12. A spherical balloon subtends an angle 2α at a man's eye and the elevation of its centre is β. If θ is the elevation of

the hightest point of the balloon at A then $\tan\theta$ is equal to

A. $\frac{\sin\alpha+\cos\beta}{\sin\beta}$

B. $\frac{\sin\alpha+\sin\beta}{\cos\beta}$

C. $\frac{\sin\alpha+\cos\beta}{\sin\alpha}$

D. $\frac{\sin\alpha+\sin\beta}{\cos\alpha}$

Answer: B

View Text Solution

13. A person stands at a point A due south of a tower and observes that its elevation is 60°. He then walks westwards towards B, where the elevation is 45°. At a point C on AB produced, he finds it to be 30°. Then AB/BC is equal to

A. $1/2$

B. 1

C. 2

D. $5/2$

Answer: B

View Text Solution

14. A pole stands at a point A on the boundary of a circular park of radius a and subtends an angle α at another point B on the boundary. If the chord AB subtends an angle α at the centre of the path, the height of the pole is

A. $2a\cos(\alpha/2)\tan\alpha$

B. $2a \sin(\alpha/2)\cot\alpha$

C. $2a \sin(\alpha/2)\tan\alpha$

D. $2a \cos(\alpha/2)\cot\alpha$

Answer: C

View Text Solution

15. A, B, C are three points on a horizontal line through the base O of a pillar OP, such that OA, OB, OC are in A.P. If α, β, γ the angles of elevation of the top of the pillar at A, B, C respectively are also in A.P. then $\sin\alpha, \sin\beta, \sin\gamma$ are in

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: B

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Exercise Numerical Answer Type Questions

1. Two poles standing on a horizontal ground are of heights 5 m and 10 m respectively. The line joining their tops makes an angle of 15° with the ground. Let d be the distance (in m) between their poles, then $\left(2-\sqrt{3}\right)d$ = _____

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2. A person observes the angle of elevation of a building as $\pi/6$. The person proceeds towards the building with a speed of $25(\sqrt{3}-1)$ m/minutes. After 2 minutes, he observes the angle of elevation as $\pi/4$. The height (in m) of the building is _____.

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3. If a flagstaff of 6 m high placed on the top of a tower throws a shadow of $2\sqrt{3}$ meters along the ground. Let θ be the angle (in degrees) that the sun makes with the ground, then the value of $\sqrt{3}\tan\theta$ = _____ .

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4. If the angles of elevation of two towers of heights h_1 and h_2 from the mid-point of the line joining their feet be $\frac{\pi}{3}$ and $\frac{\pi}{6}$, respectively, then $\frac{h_1}{h_2}$ = _____

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5. A man notices two objects in a straight line due west. After walking a distance c due north, he observes that the objects subtend an angle α at his eye, and after walking a further distance 2c due north the angle becomes β If the distance between the object is $\frac{kc}{3\cot\beta - \cot\alpha}$, then k = _____ (Ignore the height of the man)

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Questions From Previous Years Aieee Jee Main Papers

1. The upper $\left(\frac{3}{4}\right)^{th}$ portion of a vertical pole subtends an angle $\tan^{-1}\frac{3}{5}$ at a point in the horizontal plane through its foot at a distance 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

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2. A person standing on the bank of a river observes that the angle of elevation of the top of a tree on the opposite bank of the river is 60° and where he retires 40 meters away from the tree the angle of elevation becomes 30°. The breadth of the river is

A. 40 m

B. 30 m

C. 20 m

D. 60 m

Answer: C

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3. 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 $60o$ at the foot of the tower, and the angle of elevation of the top of the tower from A or B is $30o$. The height of the tower is (1) $\frac{2a}{\sqrt{3}}$ (2) $2a\sqrt{3}$ (3) $\frac{a}{\sqrt{3}}$ (4) $a\sqrt{3}$

A. $2a/\sqrt{3}$

B. $2a\sqrt{3}$

C. $a/\sqrt{3}$

D. $a\sqrt{3}$

Answer: C

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4. AB is a vertical pole with B at the ground level and A at the top. A man finds that the angle of elevation of the point A from a certain point C on the ground is $60o$. He moves away from the pole along the line BC to a point D such that $CD = 7m$. From D the angle of elevation of the point A is $45o$. Then the height of the pole is (1) $\frac{7\sqrt{3}}{2}\frac{\dot{1}}{\sqrt{3}-1}m$ (2) $\frac{7\sqrt{3}}{2}\dot{\sqrt{3}}+1m$ (3) $\frac{7\sqrt{3}}{2}\dot{\sqrt{3}}-1m$ (4) $\frac{7\sqrt{3}}{2}\frac{\dot{1}}{\sqrt{3}+1}m$

A. $\frac{7\sqrt{3}}{2}.\frac{1}{\sqrt{3}+1}m$

B. $\frac{7\sqrt{3}}{2}.\frac{1}{\sqrt{3}-1}m$

C. $\frac{7\sqrt{3}}{2}.(\sqrt{3}+1)m$

D. $\frac{7\sqrt{3}}{2}.(\sqrt{3}-1)m$

Answer: C

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5. A bird is sitting on the top of a vertical pole 20 m high and its elevation from a point O on the ground is $45o$. It flies off horizontally straight away from the point O. After one second, the elevation of the bird from O is reduced to $30o$. Then the speed (in m/s) of the bird is (1) $40\left(\sqrt{2}-1\right)$ (2) $40\left(\sqrt{3}-2\right)$ (3) $20\sqrt{2}$ (4) $20\left(\sqrt{3}-1\right)$

A. $40\left(\sqrt{2}-1\right)$

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

C. $20\sqrt{2}$

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

Answer: D

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6. The angle of elevation of the top of a vertical tower from a point P on the horizontal ground was observed to be α. After moving a distance 2 meters from P towards the foot of the tower, the angle of elevation changes to β. Then the height (in meters) of the tower is :

A. $\frac{2\sin\alpha\sin\beta}{\sin(\beta-\alpha)}$

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

C. $\frac{2\sin(\beta-\alpha)}{\sin\alpha\sin\beta}$

D. $\frac{\cos(\beta-\alpha)}{\sin\alpha\sin\beta}$

Answer: A

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7. If the angles of elevation of the top of tower from three collinear 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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8. Let 10 vertical poles standing at equal distances on a straight line , subtend the same angle of elevation α at a point O on this line and all the poles are on the same side of O. If the height of the longest pole is h and the distance of foot the smallest pole form O is α then the distance between two consecutive poles, is

A. $\frac{h\sin\alpha + a\cos\alpha}{9\sin\alpha}$

B. $\frac{h\cos\alpha - a\sin\alpha}{9\cos\alpha}$

C. $\frac{h\cos\alpha - a\sin\alpha}{9\sin\alpha}$

D. $\frac{h\sin\alpha + a\cos\alpha}{9\cos\alpha}$

Answer: C

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9. A man is walking towards a vertical pillar in a straight path, at a uniform speed. At a certain point A on the path, he observes that the angle of elevation of the top of the pillar is 30^0 . After walking for 10 minutes from A in the same direction, at a point B, he observes that the angle of elevation of the top of the pillar is60^0 . Then the time taken (in minutes) by him, from B to reach the pillar, is : (1) 6 (2) 10 (3) 20 (4) 5

A. 6

B. 10

C. 20

D. 5

Answer: D

Watch Video Solution

10. The angle of elevation of the top of a vertical tower from a point A due east of it is 45°. The angle of elevation of the top of the same tower from a point B due south of A is 30°. If the distance between A and B is $54\sqrt{2}$ m then the height of the tower (in metres), is

A. 108

B. $36\sqrt{3}$

C. $54\sqrt{3}$

D. 54

Answer: D

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11. Let a vertical tower AB have its end A on the level ground. Let C be the mid-point of AB and P be a point on the ground such that AP = 2AB. If $\sqrt{BPC = \beta}$, then tan β is equal to

A. $6/7$

B. $1/4$

C. $2/9$

D. $4/9$

Answer: C

Watch Video Solution

12. PQR is a triangular park with PQ=PR=200m . A T.V tower stands at the mid-point of QR. If the angles of elevation of the top of the tower at P , Q and R respectively 45° , 30° and 30° then the height of the tower in m is

A. 50

B. $100\sqrt{3}$

C. $50\sqrt{2}$

D. 100

Answer: D

Watch Video Solution

13. An aeroplane flying at a constant speed, parallel to the horizontal ground, $\sqrt{3}$ km above it, is observed at an elevation of 60° from a point on the ground. If, after five seconds, its elevation from the same point, is 30°, then the speed (in km/h) of the aeroplane, is

A. 750

B. 1440

C. 1500

D. 720

Answer: B

View Text Solution

14. A tower T_1 of height 60 m is located exactly opposite to a tower T_2 of height 80 m on a straight road. From the top of T_1, if the angle of depression of the foot of T_2 is twice the angle of elevation of the top of T_2, then the width (in m) of the road between the feet of the towers T_1 and T_2 is

A. $20\sqrt{3}$

B. $10\sqrt{3}$

C. $10\sqrt{2}$

D. $20\sqrt{2}$

Answer: A

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15. A man on the top of a vertical tower observes a car moving at a uniform speed towards the tower on a horizontal road. If it takes 18 minutes from the angle of depression of the car to change from $30^\circ \text{to} 45^\circ$, then after this, the time taken (in minutes) by the car to reach the foot of the tower, is

A. $9\left(1+\sqrt{3}\right)$

B. $18\left(\sqrt{3}-1\right)$

C. $\frac{9}{2}\left(\sqrt{3}-1\right)$

D. $18\left(1+\sqrt{3}\right.$

Answer: A

View Text Solution

16. Two vertical poles of heights, 20 m and 80 m stand apart on a horizontal plane. The height (in m) of the point of intersection of the lines joining the top of each pole to the foot of the other, from this horizontal plane is

A. 15

B. 18

C. 12

D. 16

Answer: D

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17. The angle fo elevation of the loop of a vertical tower standing on a horizontal plane is observed to be 45° from a point A on the plane. Let B be the point $30m$ vertically above the point A. If the angle of elevation of the top of the tower from B be 30°, then the distance (in m) of the foot of the lower from the point A is:

A. $15\left(3+\sqrt{3}\right)$

B. $15\left(5-\sqrt{3}\right)$

C. $15\left(3-\sqrt{3}\right)$

D. $15\left(1+\sqrt{3}\right)$

Answer: A

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18. If the angle of elevation of a cloud from a point P which is 25 m above a lake be 30° and the angle of depression of reflection of the cloud in the lake from P be 60°, then the height of the cloud (in meters) from the surface of the lake is

A. 60

B. 50

C. 45

D. 42

Answer: B

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19. Two poles standing on a horizontal ground are of heights 5 m and 10 m, respectively. The line joining their tops makes an angle of 15° with the ground. Then, the distance (in m) between the poles, is

A. $10\left(\sqrt{3}-1\right)$

B. $5\left(2+\sqrt{3}\right)$

C. $5\left(\sqrt{3}+1\right)$

D. $\frac{5}{2}\left(2+\sqrt{3}\right)$

Answer: B

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20. ABC is a triangular park with AB = AC = 100 m. A vertical tower is situated at the mid-point of BC. If the angles of elevation of the top of the tower at A and B are $\cot^{-1}\left(3\sqrt{2}\right)$ and $\cot^{-1}\left(2\sqrt{2}\right)$ respectively, then the height of the tower (in m) is

A. $\frac{100}{3\sqrt{3}}$

B. 25

C. 20

D. $10\sqrt{5}$

Answer: C

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Questions From Previous Years B Architecture Entrance Examination Papers

1. A vertical pole stands at a point A on the boundary of a circular park of radius a and subtends an angle α at another point β on the boundary. If the chord AB subtends an angle α at the centre of the park, the height of the pole is

A. $2a \sin\frac{\alpha}{2}\tan\alpha$

B. $2a \cos\frac{\alpha}{2}\tan\alpha$

C. $2a \sin\frac{\alpha}{2}\cot\alpha$

D. $2a \cos\frac{\alpha}{2}\cot\alpha$

Answer: A

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2. Two vehicles C_1 and C_2 start from a point P and travel east of P at the speeds 20 km/hr and 60 km/hr respectively. If an observer, one kilometre north of P, is able to see both the vehicles at the same time, then the maximum angle of sight between the observer's view of C_1 and C_2, is :

A. $\frac{\pi}{3}$

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

C. $\frac{\pi}{6}$

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

Answer: C

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3. An observer standing at a point P on the top of a hill near the sea-shore notices that the angle of depression of a ship moving towards the hill in a straight line at a constant speed is 30°. After 45 minutes, this angle becomes 45°. If T (in minutes) is the total time taken by the ship to move to a point in the sea where the angle of depression from P of the ship is 60°, then T is equal to

A. $45\left(1+\frac{1}{\sqrt{3}}\right)$

B. $45\left(1+\sqrt{3}\right)$

C. $45\left(1+\frac{2}{\sqrt{3}}\right)$

D. $45\left(2+\frac{1}{\sqrt{3}}\right)$

Answer: A

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