HEIGHTS AND DISTANCES ASSIGNMENT

1. The angle of elevation of the sun, when the shadow of the pole is $\sqrt{3}$ times the height of the pole, is

(a) 60^o (b) 30^o (c) 45^o (d) 15^o

2. Some portion of a 20 *meters* long tree is broken by the wind and the top struck the ground at an angle of 30°. The height of the point where the tree is broken is

(a) 10*m* (b) $(2\sqrt{3}-3)20m$ (c) $\frac{20}{3}m$ (d)None of these

3. A tree is broken by wind, its upper part touches the ground at a point 10 meters from the foot of the tree and makes an angle of 45° with the ground. The total length of tree is

(a) 15 *metres* (b)20 *metres* (c) $10(1+\sqrt{2})$ metres (d) $10\left(1+\frac{\sqrt{3}}{2}\right)$ metres

4. From the roof of a 15 *metre* high house the angle of elevation of a point located 15 *metre* distant to the base of the house is

(a) 45^o (b) 30^o (c) 60^o (d) 90^o

5. The angle of depression of a ship from the top of a tower 30 *metre* high is 60°, then the distance of ship from the base of tower is

(a) $30m$ (b) $30\sqrt{3}m$ (c) $10\sqrt{3}m$ (d) $10m$

6. If a flagstaff of 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) 60^o (b) 80^o (c) 75^o (d)None of these

7. The angle of depression of a point situated at a distance of 70 *metres* from the base of a tower is 45°. The height of the tower is

(a) 70*m* (b) $70\sqrt{2}m$ (c) $\frac{70}{\sqrt{2}}m$ (d) $35m$

8. The tops of two poles of height 20*m* and 14*m* are connected by a wire. If the wire makes an angle 30° with the horizontal, then the length of the wire is

(a) 12 *m* (b)10*m* (c) 8*m* (d)None of these

9. The angle of elevation of the top of a tower at a point on the ground is 30^o. If on walking 20 *metres* toward the tower, the angle of elevation becomes 60^o, then the height of the tower is

(a) 10 *metre* (b) $\frac{10}{\sqrt{3}}metre$ (c) $10\sqrt{3}$ *metres* (d) None of these

10. A person standing on the bank of a river observes that the angle subtended by a tree on the opposite bank is 60°. When he retirs 40 *meters* from the bank, he finds the angle to be 30°. The breadth of the river is

(a) 20*m* (b)40*m* (c) 30*m* (d)60*m*

11. A person walking along a straight road towards a hill observes at two points distance $\sqrt{3}$ kms., the angles of elevation of the hill to be 30° and 60°. The height of the hill is

(a) 3/2 *km* (b) $\sqrt{2/3}$ *km* (c) $\sqrt{2}+1/2$ *km* (d) $\sqrt{3}$ *kms*

12. An observer in a boat finds that the angle of elevation of a tower standing on the top of a cliff is 60° and that of the top of cliff is 30°. If the height of the tower be 60 *meters*, then the height of the cliff is

(a) 30 *m* (b) $60\sqrt{3}m$ (c) $20\sqrt{3}m$ (d)None of these

13. The upper 3/4th portion of a vertical pole subtends an angle $\tan^{-1}3/5$ at a point in the horizontal plane through its foot and at a distance 40 *m* from the foot. A possible height of the vertical pole is

(a) 20 *m* (b) 40 *m* (c) 60 *m* (d) 80 *m*

14. *AB* is a vertical tower. The point *A* is on the ground and *C* is the middle point of *AB*. The part *CB* subtend an angle α at a point P on the ground. If $AP = n\,AB.$ then the correct relation is

(a) $n=(n^2+1)\tan\alpha$ (b) $n=(2n^2-1)\tan\alpha$ (c) $n^2=(2n^2+1)\tan\alpha$ (d) $n=(2n^2+1)\tan\alpha$

15. From an aeroplane vertically over a straight horizontally road, the angles of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β, then the height in miles of aeroplane above the road is

(a) $\frac{\tan\alpha.\tan\beta}{\cot\alpha+\cot\beta}$ (b) $\frac{\tan\alpha+\tan\beta}{\tan\alpha.\tan\beta}$ (c) $\frac{\cot\alpha+\cot\beta}{\tan\alpha.\tan\beta}$ (d) $\frac{\tan\alpha.\tan\beta}{\tan\alpha+\tan\beta}$

16. The angle of elevation of the top of a tower from the top and bottom of a building of height *a* are 30° and 45° respectively. If the tower and the building stand at the same level, the height of the tower is

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

17. From the bottom of a pole of height *h*, the angle of elevation of the top of a tower is α and the pole subtends angle β at the top of the tower. The height of the tower is

(a) $\frac{h\tan(\alpha-\beta)}{\tan(\alpha-\beta)-\tan\alpha}$ (b) $\frac{h\cot(\alpha-\beta)}{\cot(\alpha-\beta)-\cot\alpha}$ (c) $\frac{\cot(\alpha-\beta)}{\cot(\alpha-\beta)-\cot\alpha}$ (d)None of these

18. From the bottom and top of a house *h meter* high, the angles of elevation of the top of a tower are α andβ. The height of the tower is

(a) $\frac{h\sin\beta}{\cos\beta-\sin\alpha}$ (b) $\frac{h\cos\beta}{\cos\beta-\cos\alpha}$ (c) $\frac{h\tan\beta}{\tan\beta-\tan\alpha}$ (d) $\frac{h\cot\beta}{\cot\beta-\cot\alpha}$

19. If the angles of elevation of two towers from the middle point of the line joining their feet be 60° and 30° respectively, then the ratio of their heights is

(a) 2 : 1 (b) $1:\sqrt{2}$ (c) 3 : 1 (d) $1:\sqrt{3}$

20. A ladder rests against a wall making an angle α with the horizontal. The foot of the ladder is pulled away from the wall through a distance *x*, so that it slides a distance *y* down the wall making an angle β with the horizontal. The correct relation is

(a) $x = y\tan\frac{\alpha+\beta}{2}$ (b) $y = x\tan\frac{\alpha+\beta}{2}$ (c) $x = y\tan(\alpha+\beta)$ (d) $y = x\tan(\alpha+\beta)$

21. The length of the shadow of a pole inclined at 10° to the vertical towards the sun is 2.05 meters, when the elevation of the sun is 38°. The length of the pole is

(a) $\frac{2.05\sin 38^o}{\sin 42^o}$ (b) $\frac{2.05\sin 42^o}{\sin 38^o}$ (c) $\frac{2.05\cos 38^o}{\cos 42^o}$ (d)None of these

22. An aeroplane flying horizontally 1 *km* above the ground is observed at an elevation of 60^o and after 10 seconds the elevation is observed to be 30^o. The uniform speed of the aeroplane in km/h is

(a) 240 (b) $240\sqrt{3}$ (c) $60\sqrt{3}$ (d)None of these

23. From a point *a* meter above a lake the angle of elevation of a cloud is α and the angle of depression of its reflection is β. The height of the cloud is

(a) $\frac{a\sin(\alpha+\beta)}{\sin(\alpha-\beta)}m$ (b) $\frac{\alpha\sin(\alpha+\beta)}{\sin(\beta-\alpha)}m$ (c) $\frac{a\sin(\beta-\alpha)}{\sin(\alpha+\beta)}m$ (d)None of these

24. A house subtends a right angle at the window of an opposite house and the angle of elevation of the window; from the bottom of the first house is 60°. If the distance between the two houses be 6 meters, then the height of the first house is

(a) $6\sqrt{3}m$ (b) $8\sqrt{3}m$ (c) $4\sqrt{3}m$ (d)None of these

25. The angle of elevation of a stationary cloud from a point 2500 *m* above a lake is 15^o and the angle of depression of its reflection in the lake is 45^o. The height of cloud above the lake level is

(a) $2500\sqrt{3}m$ (b) 2500 *m* (c) $500\sqrt{3}\ m$ (d) None of these

26. *AB* is a vertical pole resting at the end *A* on the level ground. *P* is a point on the level ground such that $AP = 3AB$. If *C* is the mid-point of *AB* and *CB* subtends an angle β at *P*, the value of tan β is

(a) $\frac{18}{19}$ (b) $\frac{3}{19}$ (c) $\frac{1}{6}$ (d)None of these

27. The angle of elevation of the top of an unfinished tower at a point distant 120m from its base is 45°. If the elevation of the top at the same point is to be 60° , the tower must be raised to a height

(a) $120(\sqrt{3}+1)\ m$ (b) $120(\sqrt{3}-1)\ m$ (c) $60(\sqrt{3}+1)\ m$ (d) None of these

28. An aeroplane flying at a height of 300 *metres* 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. The height of the lower plane from the ground (in *metres*) is

(a) $100\sqrt{3}$ (b) $\frac{100}{\sqrt{3}}$ (c) 50 (d) $150(\sqrt{3}+1)$

29. At a point on a level plane a tower subtends an angle θ and a flag staff *a* ft. in length at the top of the tower subtends an angle ϕ. The height of the tower is

(a) $\frac{a\sin\theta\cos\phi}{\cos(\theta+\phi)}$ (b) $\frac{a\sin\phi\cos(\theta+\phi)}{\sin\theta}$ (c) $\frac{a\cos(\theta+\phi)}{\sin\theta\sin\phi}$ (d) None of these

30. 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 □ be the angle of elevation then its value is

(a) $\cos^{-1}\sqrt{\frac{2h}{a}}$ (b) $\sin^{-1}\sqrt{\frac{2h}{a}}$ (c) $\sin^{-1}\sqrt{\frac{a}{2-h}}$ (d) $\tan^{-1}\sqrt{3-\frac{2h}{a}}$

31. A spherical balloon of radius *r* subtends an angle α at the eye of an observer. If the angle of elevation of the centre of the balloon be β, the height of the centre of the balloon is

(a) $r\text{cosec}\left(\frac{\alpha}{2}\right)\sin\beta$ (b) $r\,\text{cosec}\ \alpha\sin\left(\frac{\beta}{2}\right)$ (c) $r\sin\left(\frac{\alpha}{2}\right)\text{cosec}\ \beta$ (d) $r\sin\alpha\ \text{cosec}\left(\frac{\beta}{2}\right)$

32. A stationary balloon is observed from three points *A*, *B* and *C* on the plane ground and is found that its angle of elevation from each of these points is α. If ∠ABC = β and *AC* = *b*, the height of the balloon is

(a) $\frac{b}{2\sin\beta\cot\alpha}$ (b) $\frac{2b}{\sin\beta\cot\alpha}$ (c) $\frac{b}{2\sin\alpha\cot\beta}$ (d) $\frac{2b}{\sin\alpha\cot\beta}$

33. The angle of elevation of the top of the tower observed from each of the three points *A, B, C* on the ground, forming a triangle is the same angle α. If *R* is the circum-radius of the triangle *ABC*, then the height of the tower is

(a) $R\sin\alpha$ (b) $R\cos\alpha$ (c) $R\cot\alpha$ (d) $R\tan\alpha$

34. A balloon is observed simultaneously from three points *A*, *B* and *C* on a straight road directly under it. The angular elevation at *B* is twice and at *C* is thrice that of *A*. If the distance between *A* and *B* is 200 metres and the distance between *B* and *C* is 100 metres , then the height of balloon is given by

(a) 50 *metres* (b) $50\sqrt{3}$ *metres* (c) $50\sqrt{2}$ *metres* (d)None of these

35. Three poles whose feet *A, B, C* lie on a circle subtend angles 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

36. *PQ* is a vertical tower. *P* is the foot, *Q* the top of the tower, *A*, *B*, *C* are three points in the horizontal plane through *P*. The angles of elevation of Q from *A*, *B*, *C* are equal and each is equal to θ. The sides of the triangle *ABC* are *a*, *b*, *c* and the area of the triangle *ABC* is Δ. The height of the tower is

(a) $\frac{abc\tan\theta}{4\Delta}$ (b) $(abc)\cot\frac{\theta}{4\Delta}$ (c) $(abc)\sin\frac{\theta}{4\Delta}$ (d) None of these

37. A tower *AB* leans towards west making an angle α with the vertical. The angular elevation of B, the topmost point of the tower is β as observed from a point *C* due west of A at a distance *d* from A. If the angular elevation of B from a point *D* due east of *C* at a distance 2*d* from *C* is γ, then $2\tan\alpha$ can be given as

(a) $3\cot\beta - 2\cot\gamma$ (b) $3\cot\gamma - 2\cot\beta$ (c) $3\cot\beta - \cot\gamma$ (d) $\cot\beta - 3\cot\gamma$

38. *ABC* is a triangular park with *AB*=*AC*=100 m. A clock tower is situated at the mid-point of *BC*. The angles of elevation of the top of the tower at *A* and *B* are $\cot^{-1}3.2$ and $\cos ec^{-1}2.6$ respectively. The height of the tower is

(a) 50 *m* (b)25 *m* (c) 40 *m* (d)None of these