MATHS

BOOKS - PUNEET DOGRA

HEIGHT & DISTANCE

Practice Sheet

1. A vertical pole with height more than 100 consists of two parts, the lower being one - third of the whole. At a point on a horizontal

plane through the foot and 40m from it, the upper part subtends an angle whose tangent is $\frac{1}{2}$ What is the height of the pole?

A. 110m

B. 120 m

C. 200m

D. 150m

Answer: C

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2. The angle of elevation of the top of a pillar of height h at a point on the ground at a distance x from the pillar is 30°. On walking a distance d' towards the pillar the angle of elevation becomes 60° Then, which one of the following is correct?

A. $x = d + h$

B. $x = \frac{3d}{2}$

C. $x = \frac{3d}{4}$

D. $x = 2d$

Answer: B

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3. The angle of elevation of the top of a tower EF (F being the foot of the tower) as seen from a point A which is on the same level as F. is a. On advancing towards the foot of the lower the angle of elevation of the top of the tower as seen from a point B such that AB = x. is β. If BF = y. h is the height of the tower and

$\alpha + \beta = \frac{\pi}{2}$. then which one of the following is correct?

A. A. $h^2 = x^2 + xy$

B. B. $h = y^2 + xy^2$

C. C. $h^2 = y^2 + xy$

D. D. $h = y + x^2 y$

Answer: C

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4. The lower 24 m portion of a 50m tall tower is painted green and the remaining portion red. What is the distance of a point on the ground from the base of the tower where the two different portions of the tower subtend equal angles?

A. 60m

B. 72m

C. 90m

D. 120m

Answer: D

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5. What should be the height of a flag where a 20 feet long ladder reaches 20 feet below the flag (The angle of elevationof the top of the flag at the foot of the ladder is 60°?

A. 20 feet

B. 30 feet

C. 40 feet

D. $20\sqrt{2}$ feet

Answer: B

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6. PT. a tower of height 2^x metre, P being the foot. T being the top of the tower. A, B are points on the same line with P. If $AP = 2^{x+1}m$. $BP = 192m$ and if the angle of elevation of the tower as seen from b is

double the angle of the elevation of the tower as seen from A, then what is the value of x?

A. A. 6

B. B. 7

C. C. 8

D. D. 9

Answer: C

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7. The foot of a tower of height h m is in a direct line between two observers A and B. If the angles of elevationof the top of the tower as seenfrom and B are α and beta` respectively and if AB = d m, then what is h/d equal to?

A. $\dfrac{\tan(\alpha+\beta)}{(\cot\alpha\cot\beta-1)}$

B. $\dfrac{\cot(\alpha+\beta)}{(\cot\alpha\cot\beta-1)}$

C. $\dfrac{\tan(\alpha+\beta)}{(\cot\alpha\cot\beta+1)}$

D. $\dfrac{\cot(\alpha+\beta)}{(\cot\alpha\cot\beta+1)}$

Answer: B

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8. A man observes the elevation of a balloon to be 30°. He, then walks 1 km towards the baoon and finds that the elevation is 60° What is the height of the balloon?

A. $1/2km$

B. $\sqrt{3}/2km$

C. $1/3km$

D. $1km$

Answer: B

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9. The angle of elevation from a point on the bank of a river of the top of a temple on the other bank is 45° Retreating 50m, the observer finds the new angle of elevation as 30°. What is the width of the river?

A. 50 m

B. $50\sqrt{3}$m

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

D. $100m$

Answer: C

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10. Looking from the top of a 20 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of to its bottom is 30°. What is he height of the tower?

A. 50m

B. 60 m

C. 70m

D. 80m

Answer: D

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11. Two houses are collinear with the base of a lower and are at distance 3m and 12m from the base of the tower. The angles of elevation

from these two houses of the top of the tower are complementary What is the height of the lower

A. 4m

B. 6m

C. $7.5m$

D. 36 m

Answer: B

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12. The angle of depression of vertices of a regular hexagon lying in a plane from the top of a 75 m high tower standing at the centre of the hexagon is 60°. What is the length of each side of the hexagon ?

A. $50\sqrt{3}m$

B. $75m$

C. $25\sqrt{3}m$

D. $25m$

Answer: C

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13. A ladder of 17 ft. length reaches a window which is 15 ft. above the ground on one side of the street. Keeping its foot at the same point the ladder is turned to the other side of the street and now it reaches a window 8 ft. high. What is the width of the street ?

A. 23 ft

B. 15 ft

C. 25 ft

D. 30 ft

Answer: A

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14. The heights of two trees are x and y where $x > y$. The tops of the trees are at a distance z apart. If s in the shortest distance between the trees, then what is s^2 equal to ?

A. $x^2 - y^2 - z^2 - 2xy$

B. $x^2 + y^2 - z^2$

C. $x^2 + y^2 + z^2 - 2xy$

D. $z^2 - x^2 - y^2 + 2xy$

Answer: D

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15. From a certain point on a straight road, a person observes a tower in the west direction at a distance of 200 m. He walks some distance 'along the road and finds that the same tower

is 300 m south of him. What is the shortest distance of the tower from the road?

A. $\frac{300}{\sqrt{13}}m$

B. $\frac{500}{\sqrt{13}}m$

C. $\frac{600}{\sqrt{13}}m$

D. $\frac{900}{\sqrt{13}}m$

Answer: C

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Prev Year Questions

1. A ladder 9m long reaches a point 9 m below the top of a vertical flagstaff. From the foot of the ladder, the elevation of the ladder is 60°. What is the height of the flag staff?

A. $10.5m$

B. $13.5m$

C. $13.5m$

D. $15m$

Answer: C

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2. The angle of elevation of a tower of heighth from a point A due south of it is x and from a point B due east of A is y. If AB = 2, then which one of the following is correct?

A. $h^2(\cot^2 y - \cot^2 x) = 2^2$

B. $z^2(\cot^2 y - \cot^2 x) = h^2$

C. $h^2(\cot^2 y - \cot^2 x) = h^2$

D. $h^2(\tan^2 y - \tan^2 x) = h^2$

Answer: A

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3. The top of a hill observed from the top and bottom of a building height h is at angles of elevation $\frac{\pi}{6}$ and $\frac{\pi}{3}$ respectively. what is the height of the hill?

A. 2h

B. $\frac{3h}{2}$

C. h

D. $\frac{h}{2}$

Answer: B

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4. balloon is directly above one end of bridge. The angle of depression of the other end of the bridge from the balloon is 48°. If the height of the balloon above the bridge is 122 m, then what is the length of the bridge?

A. $122\sin 48^\circ m$

B. $122\tan 42^\circ m$

C. $122\cos 48^\circ m$

D. $122\tan 48^\circ m$

Answer: B

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5. If a flag-staff of 6 m height plated on the top of a tower throws a shadow of $2\sqrt{3}$ m along the ground then what is the angle that the sun makes with the ground ?

A. 60°

B. 45°

C. 30°

D. 15°

Answer: A

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6. A spherical balloon of radius r subtends an angle 'theta' at an observer's eye. The angle of elevation of centre of the balloon is ϕ. Prove

that the height of the centre of the ball is $r \sin \phi \cos ec \frac{\theta}{2}$.

A. $\frac{r \sin \beta}{\sin\left(\frac{\alpha}{2}\right)}$

B. $\frac{r \sin \beta}{\sin\left(\frac{\alpha}{4}\right)}$

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

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

Answer: A

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7. The angle of elevation of a stationary cloud from a point 2500m m above a lake is 15° and the angle of depression of its image in the lake is 45°. The height the cloud above the lake level is

A. A. 2500 m

B. B. $2500\sqrt{3}m$

C. C.$5000m$

D. D. $500\sqrt{3}m$

Answer: B

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8. The angles of elevation of the top of a tower form the top and foot of a pole are respectively 30° and 45° is hy is the height of the tower and he is the height of the pole, then which of the following are correct?

1. $\frac{2h_p h_r}{3+\sqrt{3}} = h_p^2$
2. $\frac{h_l - h_p}{\sqrt{3}+1} = \frac{h_P}{2}$
3. $\frac{2(h_p + h_I)}{h_I} = 4 + \sqrt{3}$

Select the correct answer using the code given below:

A. 1 and 3 only

B. 2 and 3 only

C. 1 and 2 only

D. 1.2 and 3

Answer: C

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9. From the top of a lighthouse. 100 m high, the angle of depression of two ships are 30° and 45°, if both ships are on same side find the distance between the ships ?

A. A. 120 m

B. B. 180 m

C. C. 240 m

D. D. 360 m

Answer: C

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10. The top of a hill when observed from the top and bottom of a building of height h is at angles of elevation p and q respectively. What is the height of the hill?

A. $\frac{h \cot q}{\cot q - \cot p}$

B. $\frac{h \cot p}{\cot p - \cot q}$

C. $\frac{2h \tan p}{\tan p - \tan q}$

D. $\frac{2h \tan q}{\tan q - \tan p}$

Answer: B

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11. A boat is moving away from an observation tower .It makes an angle of depression of 30° with an observer 's eye when at a distance of 50 metre from the tower . After 8 seconds ,the angle of depression becomes 60° .By as - suming that it is running in still water , the approximate speed of the boat is :

A. $\frac{4500}{\sqrt{3}}$

B. $\frac{4500\left(\sqrt{3}-1\right)}{\sqrt{3}}$

C. $4500\sqrt{3}$

D. $\frac{4500\left(\sqrt{3}+1\right)}{\sqrt{3}}$

Answer: B

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12. Two poles are 10 m and 20 m high. The line joining their tops makes an angle of 15° with

the horizontal. The distance between the poles is approximately equal to

A. 36.3

B. $37.3m$

C. $38.3m$

D. $39.3m$

Answer: B

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13. A vertical tower standing on a leveled field is mounted with a vertical flag staff of length 3 m. From a point on the field, the angles of elevation of the bottom and tip of the flag staff are 30° and 45° respectively, which one of the following gives the best approximation to the height of the tower?

A. A) $3.\ 90m$

B. B) $4.00m$

C. C) $4.\ 10m$

D. D) $4.25m$

Answer: C

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14. The angle of elevation of the top of a tower from a point 20 m away from its base is 45°. What is the height of the tower?

A. 10 m

B. 20 m

C. 30 m

D. 40 m

Answer: B

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15. The angles of elevation of the top of a tower standing on a horizontal plane from two points on a line passing through the foot of the tower at distances 49 m and 36 m are

43° and 47° respectively. What is the height of the tower?

A. A) 40 m

B. B) 42 m

C. C) 45 m

D. D) 47 m

Answer: B

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16. A lamp post stands on a horizontal plane. From a point situated at a distance 150 m from its foot, the angle of elevation of the top is 30°. What is the height of the lamp post?

A. $50m$

B. $50\sqrt{3}m$

C. $\frac{50}{\sqrt{3}}m$

D. $100m$

Answer: B

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17. From an aeroplane above a straight road the angles of depression of two positions at a distance 20 m apart on the road are observed to be 30° and 45°. The height of the aeroplane above the ground is

A. $10\sqrt{3}m$

B. $10(\sqrt{3}-1)m$

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

D. $20m$

Answer: C

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18. If the angles of elevation of the top of a tower from two places situated at distances 21 m and x m from the base of the tower are 45° and 60° respectively, then what is the value of x?

A. $7\sqrt{3}m$

B. $7 - \sqrt{3}m$

C. $7+\sqrt{3}m$

D. 14

Answer: A

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19. 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 returns 40 m from the bank, he finds the angle to be 30°. What is the breadth of the river?

A. A) 60 m

B. B) 40 m

C. C) 30 m

D. D) 20 m

Answer: D

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20. The angle of elevation of the top of a tower of height H from the foot of another tower in the same plane is 60° and the angle

of elevation of the top of the second tower from the foot of the first tower is 30°. If is the height of the other tower is h , then which one of the following is correct?

A. A. $H = 2h$

B. B. $H = \sqrt{3}h$

C. C. $H = 3h$

D. D. None of these

Answer: C

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21. A man walks 10 m towards a lamp post and notices that the angle of elevation of the top of the post increases from 30° to 45° the height of the lamp post is

A. A. 10 m

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

C. C. $\left(5\sqrt{3}-5\right)m$

D. D. $\left(10\sqrt{3}+10\right)m$

Answer: B

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

A. A. 25 m

B. B. $25\sqrt{3}m$

C. C. $50m$

D. D. None of these

Answer: B

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23. The top of a hill observed from the top and bottom of a building of height h is at angles of elevation α and β. respectively. The height of the bill is

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

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

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

D. None of these

Answer: B

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24. From the top of a lighthouse 70 m high with its base at sea level, the angle of depression of a boat is 15°. The distance of the boat from the foot of the lighthouse is

A. A. $70(2-\sqrt{3})m$

B. B. $(70(2+\sqrt{3})m$

C. C. $70(3-\sqrt{3})m$

D. D. $70(3+\sqrt{3})m$

Answer: B

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25. Two poles are 10 m and 20 m high. The line joining their tips makes an angle of 15° with the horizontal What is the distance between the poles?

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

B. $5(4+2\sqrt{3})m$

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

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

Answer: B

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26. The angle of elevation of a tower at a level ground is 30°. The angle of elevation becomes θ when moved 10 m towards the

tower. If the height of tower is $5\sqrt{3}$ m, then what is the value of θ ?

A. 45°

B. 60°

C. 75°

D. None

Answer: B

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27. From the top of a building of height h m, the angle of depression of an object on the ground is θ. What is the distance (in m) of the object from the foot of the building?

A. $h \cot \theta$

B. $h \tan \theta$

C. $h \cos \theta$

D. $h \sin \theta$

Answer: A

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28. The angle of elevation of the top of a lower at a distance of 25 m from its foot is 60° The approximate height of the tower is -

A. 15 m

B. 16 m

C. 17 m

D. 18 m

Answer: C

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29. What is the angle subtended by 1 m pole at distance 1 km on the ground in sexagesimal measure?

A. A) $\frac{9}{50\pi}$ deg ree

B. B) $\frac{9}{5\pi}$ deg ree

C. C) 3.4 min

D. D) 3.5 min

Answer: A

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30. A lower of height 15 m stands vertically on the ground. From a point on the ground the angle of elevation of the top of the tower is found to be 30°. What is the distance of the point from the foot of the tower?

A. $15\sqrt{3}m$

B. $10\sqrt{3}$

C. $5\sqrt{3}$

D. 30

Answer: A

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31. At a point 15 m away from the base of a 15 m high house, the angle of elevation of the top is

A. 90°

B. 60°

C. 45°

D. 30°

Answer: C

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32. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of elevation of the bottom of the flag staff is β and that of the top is α What is the height of the tower?

A. $\frac{h \tan \beta}{\tan \alpha}$

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

C. $\frac{h \cos \beta}{\tan \alpha - \tan \beta}$

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

Answer: A

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33. An aeroplane flying at a height of 300 m above the ground passes vertically above another plane at an instant when the angles

of elevation of two planes from the same point on the ground are 60° and 45°, respectively. What is the height of the lower plane from the ground?

A. 50 m

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

C. $100\sqrt{3}m$

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

Answer: C

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34. A man standing on the bank of a river observes that the angle of elevation of the top of a tree just on the opposite bank is 60°. The angle of elevation is 30° from a point at a distance y m from the bank. What is the height of the tree?

A. A. y m

B. B. 2y m

C. C. $\frac{\sqrt{3}y}{2}m$

D. D. $\frac{y}{2}m$

Answer: C

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35. Two poles are 10 m and 20 m high. The line joining their tops makes an angle of 15° with the horizontal. The distance between the poles is approximately equal to

A. $35.3m$

B. $37.3m$

C. $41m$

D. $44m$

Answer: B

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36. From the top of a lighthouse 120 m above the sea, the angle of depression of a boat is 15°. what is the distance of the boat from the lighthouse?

A. A. 120(2+√3)m

B. B. 120 m

C. 444 m

D. None of these

Answer: C

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37. The angle of elevation of the top of a flag post from a point 5 m away from its base is 75°. What is the approximate height of the flag post?

A. 15 m

B. 17 m

C. 19 m

D. 21 m

Answer: C

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