

MATHS

BOOKS - NAVBODH MATHS (HINGLISH)

TRIGONOMETRY

Choose The Correct Alternative From Those Given Below Each Question

1. $\sin. \theta. \cos ec\theta = \dots$

A. 1

B. 0

C. $\frac{1}{2}$

D. $\sqrt{2}$

Answer: A



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2. If $\sin(90 - \theta) = \frac{1}{\sqrt{2}}$ then the value of θ is ..

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B



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3. Which of the following statement is true?

A. $\sin A = \cos(90 - A)$

B. $\cos A = \sec(90 - A)$

C. $\tan A = \tan(90 - A)$

D. $\sin A = \operatorname{cosec}(90 - A)$

Answer: A



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4. $1 + \tan^2 \theta = \dots\dots$

A. $\sin^2 \theta$

B. $\sec^2 \theta$

C. $\cos ec^2 \theta$

D. $\cot^2 \theta$

Answer: B



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5. $\operatorname{cosec}45^\circ = \dots\dots$

A. $\frac{1}{\sqrt{2}}$

B. $\sqrt{2}$

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

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

Answer: B



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6. When we see at a higher level, from the horizontal line, angle formed is..

- A. angel of elevation
- B. angle of depression
- C. 0
- D. straight angle

Answer: A



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7. If the ladder is inclined at an angle of 30° with the ground and it reaches at a height of $4m$ from the ground, the the

length of the ladder is

A. $5m$

B. $8m$

C. $2m$

D. $8\sqrt{3}m$

Answer: B



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8. If $\sin \theta = \cos \theta$, θ is an acute angle, then $\tan \theta = \dots$

A. 2

B. $\frac{1}{\sqrt{2}}$

C. $\sqrt{2}$

D. 1

Answer: D



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9. The value of $2\tan 45^\circ - 2\sin 30^\circ$ is .

A. 2

B. 1

C. $\frac{1}{2}$

D. $\frac{3}{4}$

Answer: B



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10. The value of $2\sec 10^\circ \times \cos 10^\circ$ is .

A. 1

B. 90°

C. $2\cos^2 10^\circ$

D. 2

Answer: D



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11. If $\cot \theta = \frac{1}{\sqrt{3}}$ then $\sec^2 \theta = ?$

A. $\frac{4}{3}$

B. $\frac{3}{4}$

C. $\frac{4}{\sqrt{3}}$

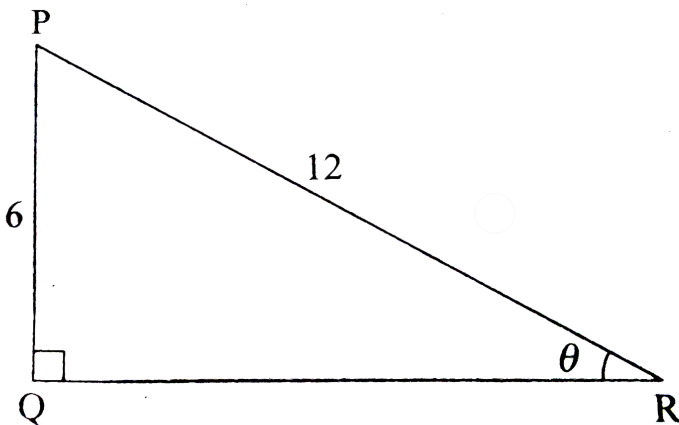
D. $\frac{2}{\sqrt{3}}$

Answer: A

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Assignment

1. Observe the figure and write the value of $\sin \theta$.



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2. What is the value of $\sec^2 \theta - \tan^2 \theta$?

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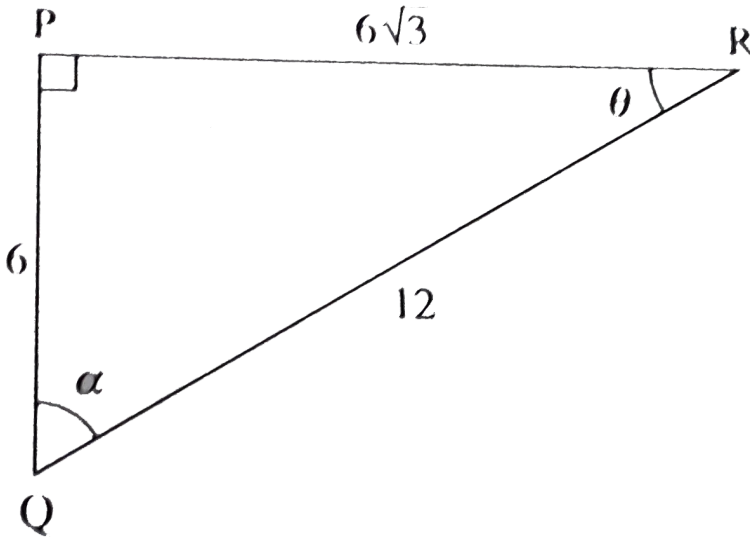
3. Write the value of $\cos 30^\circ$ and $\tan 45^\circ$.

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4. What is the value of $\tan \theta \times \cot \theta$?

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5. Observe the figure and write the value of θ and α .



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6. If $\sec \theta = \frac{25}{7}$ then find the value of $\tan \theta$.

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7. If $\sin \theta = \frac{11}{61}$, find the value of $\cos \theta$ using trigonometric identity.

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8. Solve the following activity and find the value of $6 \tan^2 \theta - \frac{6}{\cos^2 \theta}$

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9. Prove: $\frac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta$

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10. Prove that $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

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11. Complete the following activity by filling the boxes

$$\sin^2 \theta + \cos^2 \theta = \square \text{(Identity)}$$

Dividing each term by $\cos^2 \theta$

$$\frac{\sin^2 \theta}{\cos^2 \theta} + \frac{\cos^2 \theta}{\cos^2 \theta} = \frac{\square}{\cos^2 \theta}$$

$$\therefore \square + 1 = \square$$

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12. Prove that $\sec \theta + \tan \theta = \frac{\cos \theta}{1 - \sin \theta}$

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13. Prove : $\cot^2 \theta - \tan^2 \theta = \cos ec^2 \theta - \sec^2 \theta$



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14. If $\tan \theta = 1$, then $\frac{\sin \theta + \cos \theta}{\sec \theta + \cos ec \theta} =$



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15. Prove : $(\sec \theta - \cos \theta)(\cot \theta + \tan \theta) = \tan \cdot \sec \theta$



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16. Prove $\cot \theta + \tan \theta = (\cos ec \theta)(\sec \theta)$ by completing the

following activity: $\text{LHS} = \cot \theta + \tan \theta = \frac{\cos \theta}{\sin \theta} + \frac{\square}{\cos \theta}$

$$\begin{aligned}
 &= \frac{\square + \square}{\sin \theta \times \cos \theta} &= \frac{\square}{\sin \theta \times \cos \theta} &= \frac{1}{\square} \times \frac{1}{\square} \\
 &= \csc \theta \times \sec \theta = RHS \quad \therefore \cot \theta + \tan \theta = \csc \theta \times \sec \theta
 \end{aligned}$$

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17. Prove: $\frac{\tan \theta}{\sec \theta - 1} = \frac{\tan \theta + \sec \theta + 1}{\tan \theta + \sec \theta - 1}$

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18. When observer at a distance of $12m$ from a tree looks at the top of the tree, the angle of elevation is 60° . What is the height of the tree?

$$(\sqrt{3} = 1.73)$$

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19. From the top of a lighthouse, an observer looking at a boat makes an angle of depression of 60° . If the height of the lighthouse is $90m$, then find how far is the boat from the lighthouse.

$$(\sqrt{3} = 1.73)$$

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20. If

$$\frac{1}{\sin^2 \theta} - \frac{1}{\cos^2 \theta} - \frac{1}{\tan^2 \theta} - \frac{1}{\cot^2 \theta} - \frac{1}{\sec^2 \theta} - \frac{1}{\operatorname{cosec}^2 \theta} = -3$$

then find the value of θ .

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21. If $\sec \theta = \frac{13}{12}$, find the values of other trigonometric ratios.

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22. If $\sqrt{3} \tan \theta = 3 \sin \theta$ and $\theta \neq 0$ then find the value of $\sin^2 \theta - \cos^2 \theta$.

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23. Prove: $\sec^4 A (1 - \sin^4 A) - 2 \tan^2 A = 1$

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24. Prove : $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0$.

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25. Two persons on the same side of a tall building notice the angle of elevation of the top of the building to be 30° and 60° respectively. If the height of the building is $72m$, find the distance between the two persons to the nearest metre.
($\sqrt{3} = 1.73$)

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26. A ladder on the platform of a firebrigade van can be elevated at an angle of 70° to the maximum. The length of the ladder can be extended upto $20m$. If the platform is $2m$ above the ground, find the maximum height from the ground upto which the ladder can reach ($\sin 70^\circ = 0.94$)

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27. While landing at an airport, a pilot made an angle of depression of 20° . Average speed of the plane was $200\text{km}/\text{h}$. The plane reached the ground after 54 seconds. Find the height at which the plane was when it started landing.

$$(\sin 20^\circ = 0.342)$$



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Assignment 7 1

1. $\cos \theta \times \sec \theta = ..$

A. 0

B. 1

C. 2

D. $\frac{1}{\sqrt{2}}$

Answer: B



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2. $1 + \cot^2 \theta = \dots$

A. $\tan^2 \theta$

B. $\cos^2 \theta$

C. $\operatorname{cosec}^2 \theta$

D. $\sec^2 \theta$

Answer: C



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3. $\frac{1 + \tan^2 A}{1 + \cot^2 A} = ..$

A. $\sec^2 A$

B. -1

C. $\cot^2 A$

D. $\tan^2 A$

Answer: D



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4. What is the value of $9 \cot^2 \theta - 9 \operatorname{cosec}^2 \theta$?

A. 9

B. -9

C. 1

D. -1

Answer: B



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5. A person is standing at a distance of $80m$ from the church looking at its top. The angle of elevation is 45° . The height of the church is.

A. $40m$

B. $90m$

C. $80m$

D. $40\sqrt{3}m$

Answer: C



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6. If $\frac{1 - \sin^2 A}{\cos^2 A} = \tan \theta$, then the value of θ is .

A. 60°

B. 45°

C. 90°

D. 30°

Answer: B



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7. $\cot 60^\circ \times \tan 30^\circ = ?$

A. $\frac{2}{\sqrt{3}}$

B. 3

C. $\frac{1}{3}$

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

Answer: C



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Assignment 7 2

1. Write the value of $\sin 45^\circ$ and $\tan 60^\circ$.



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2. If $\cos \theta = \frac{\sqrt{3}}{2}$ then what is the value of θ ?



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3. What is the value of $\sin^2 \theta + \cos^2 \theta$?

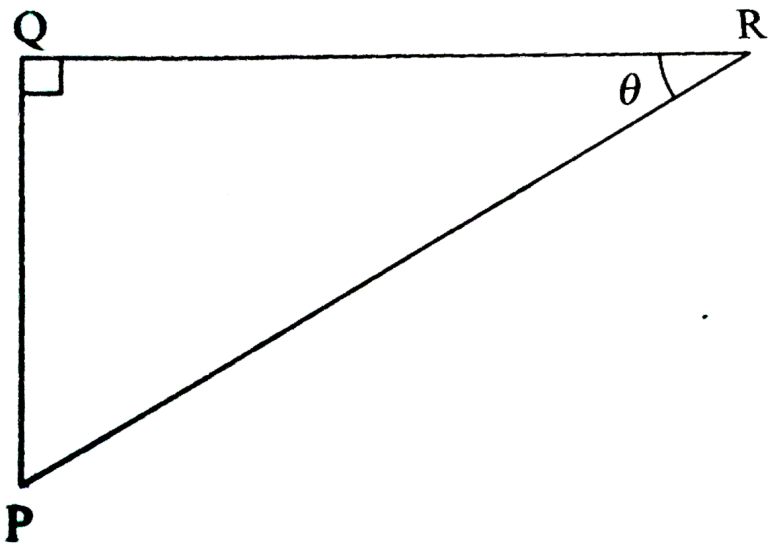


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4. What is the value of $\cot^2 72^\circ - \operatorname{cosec}^2 72^\circ$?



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5.

In the figure $\sin \theta = \square$, $\tan \theta = \square$

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Assignment 7 3

1. If $\sin \theta = \frac{60}{61}$ then find $\cos \theta$ and $\tan \theta$.

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2. If $\cot \theta = \frac{24}{7}$, then find $\cos \theta$ and $\sin \theta$.

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3. Prove: $\cos \theta \sqrt{1 - \cos^2 \theta} = \sin \theta$

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4. Prove : $(\sec \theta + \tan \theta)(1 - \sin \theta) = \cos \theta$.

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5. Prove that : $\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \cdot \operatorname{cosec}^2 \theta$

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6. Prove: $\frac{\tan^3 \theta - 1}{\tan \theta - 1} = \sec^2 \theta + \tan \theta.$

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7. If $\tan \theta + \frac{1}{\tan \theta} = 2$, then show that $\tan^2 \theta + \frac{1}{\tan^2 \theta} = 0$

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8. If $x = a \sin \theta$ and $y = b \cos \theta$, then prove : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

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9. What is the value of $\cot^2 \theta - \frac{1}{\sin^2 \theta}$?

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10. Prove the following identities:

$$\frac{1}{\sec \theta - \tan \theta} = \sec \theta + \tan \theta$$



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11. Complete the following activity by filling the boxes.

$$\sin^2 \theta + \cos^2 = \square \dots (\text{Identity})$$

Dividing each term by $\sin^2 \theta$, we get

$$\frac{\sin^2 \theta}{\sin^2 \theta} + \frac{\cos^2 \theta}{\sin^2 \theta} = \frac{\square}{\sin^2 \theta}$$

$$\therefore 1 + \square = \square$$



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12. Prove: $\cot^2 \theta - \tan^2 \theta = \cos^2 \theta - \sec^2 \theta$.



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13. Prove the following identity:

$$\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$$

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Assignment 7 4

1. Prove: $\frac{\sin \theta + \operatorname{cosec} \theta}{\sin \theta} = 2 + \cot^2 \theta.$

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2. If $5 \sec \theta - 12 \operatorname{cosec} \theta = 0$, find the values of $\sec \theta$, $\cos \theta$ and $\sin \theta$.

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3. Prove that $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sec \theta + \tan \theta$

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4. Prove: $\sqrt{\sec^2 \theta + \cos ec^2 \theta} = \tan \theta + \cot \theta.$

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5. Prove: $\tan^2 \theta + \cot^2 \theta + 2 = \sec^2 \theta \cdot \cos ec^2 \theta.$

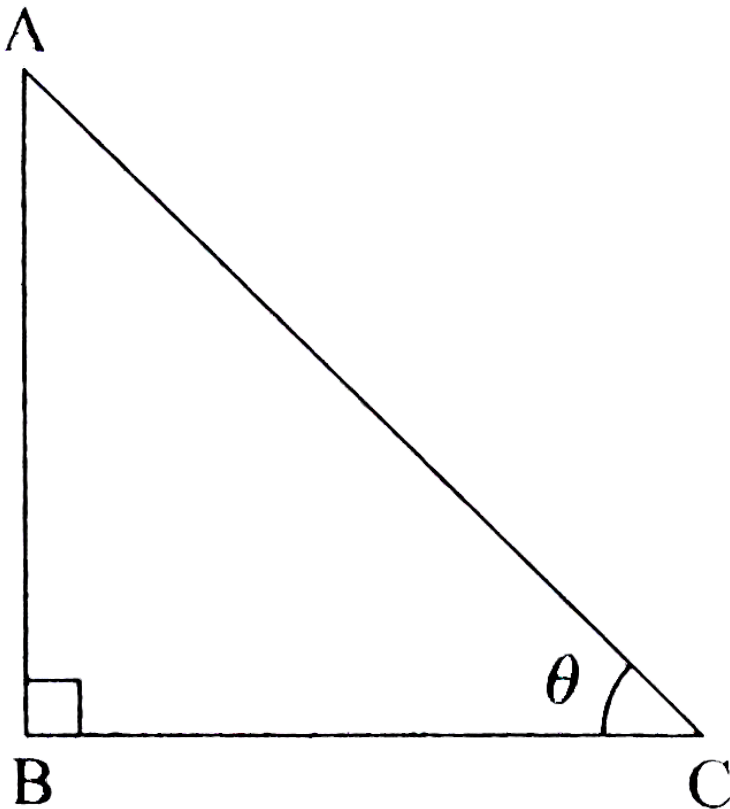
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6. With the information given in the figure

(i) Write $\sec \theta$ and $\sec^2 \theta$.

(ii) Write $\tan \theta$ and $\tan^2 \theta$

(iii) Find $1 + \tan^2 \theta$, compare it with $\sec^2 \theta$ and write your conclusion.



7. From a top of a lighthouse, an observer looks at the ship and find the angle of depression to be 45° . If the height of the lighthouse is $1000m$, then how far is that ship from the lighthouse.



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8. A tree $12m$ high, is broken by the wind in such a way that its top touches the ground and makes an angle 60° with the ground. At what height from the bottom the tree is broken by the wind?



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9. Two buildings are facing each other on a road of width 5m. From the top of the first building which is $2m$ high, the angle of elevation of the top of the second is found to be 30° . What is the height of the second building?

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Assignment 7 5

1. If $\tan \theta = 2$, find the values of other trigonometric ratios.

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2. If $\sin \theta = \frac{3}{5}$, find the values of other trigonometric ratios.

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3. To find the width the river, a man observes the top of a tower on the opposite bank making an angle of elevation 61° . When he moves $50m$ backward from bank and observes the same top of the tower, his line of vision makes an angle of elevation 35° . Find the height of the tower and width of the river. ($\tan 61^\circ = 1.8, \tan 35^\circ = 0.7$)



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4. Roshani saw an eagle on the top of a tree at an angle of elevation of 61° , while she was standing at the door of her house. She went on the terrace of the house so that she could see it clearly. The terrace was at a height of $4m$. While observing the eagle from there the angle of elevation was 52° .

At what height from the ground was the eagle?

$$\tan 61^\circ = 1.8, \tan 52^\circ = 1.28, \tan 29^\circ = 0.55, \tan 38^\circ = 0.78)$$



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5. Eliminate θ if $x = a \cot \theta - b \operatorname{cosec} \theta$ and

$$y = a \cot \theta + b \operatorname{cosec} \theta.$$



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6. If $\cos \theta = \frac{\sqrt{3}}{2}$ then find the value of $\frac{1 - \sec \theta}{1 + \operatorname{cosec} \theta}$



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7. A peacock is sitting on the tree and observes its prey on the ground. It makes an angle of depression of 22° to catch the prey. The speed of the peacock was observed to be 10 km/hr and it catches its prey in 1 min 12 seconds. At what height was the peacock on the tree?

($\cos 22^\circ = 0.927$, $\sin 22^\circ = 0.374$, $\tan 22^\circ = 0.404$)



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Examples For Practice 1 Mark Multiple Choice Questions

1. (A) Choose the correct alternative :

$$\cot \theta \times \tan \theta = \dots\dots\dots$$

A. 0

B. 1

C. 2

D. $\frac{1}{\sqrt{2}}$

Answer: B



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$$2. 1 + \cot^2 \theta = \dots$$

A. $\tan^2 \theta$

B. $\cos^2 \theta$

C. $\operatorname{cosec}^2 \theta$

D. $\sec^2 \theta$

Answer: C



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3. The value of $9 \cot^2 \theta - 9 \operatorname{cosec}^2 \theta$ is

A. 9

B. -9

C. 1

D. -1

Answer: B



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4. Write the value of $\operatorname{cosec}^2(90^\circ - \theta) - \tan^2 \theta$.

A. 1

B. -1

C. 2

D. -2

Answer: A



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5. Simplest form of $(1 + \tan^2 A)/(1 + \cot^2 A)$ IS

A. $\sec^2 A$

B. -1

C. $\cot^2 A$

D. $\tan^2 A$

Answer: D



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6. $\frac{1 - \tan^2 45^\circ}{1 + \cot^2 A}$ is equal to

A. $\sin 0^\circ$

B. $\sin 90^\circ$

C. $\sin 45^\circ$

D. $\sin 30^\circ$

Answer: A



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7. $\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$

A. $\frac{\sqrt{3}}{4}$

B. $\frac{1}{2}$

C. $\sqrt{\frac{1}{3}}$

D. $\sqrt{3}$

Answer: D



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8. If $\cos A + \cos^2 A = 1$, then prove that $\sin^2 A + \sin^4 A = 1$.

A. -1

B. 0

C. 1

D. none of these

Answer: C



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9. The value of $[(\sec A + \tan A)(1 - \sin A)]$ is equal to $\tan^2 A$ (b) $\sin^2 A$ (c) $\cos A$ (d) $\sin A$

A. $\sin A$

B. $\cos A$

C. $\sec A$

D. $\cot A$

Answer: B



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10. If the altitude of the sun is at 60° , then the height of the vertical tower that will cast a shadow of length 30m is $30\sqrt{3}m$

(b) $15m$ (c) $\frac{30}{\sqrt{3}}m$ (d) $15\sqrt{2}m$

A. 30 m

B. $15\sqrt{3}m$

C. 15 m

D. $30\sqrt{3}$

Answer: D



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11. From the top of cliff 50 m high the angle of elevation of a tower is found to be equal to the angle of depression of the foot of the tower. The height of the tower is

A. 50 m

B. 150 m

C. 100 m

D. 125 m

Answer: C



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12. The tops of two poles of height 20 m and 14 m are connected by a wire. If the wire makes an angle of 30° with horizontal, then the length of the wire is (a) 12 m (b) 10 m (c) 8 m (d) 6 m

A. 12 m

B. 20 m

C. 14 m

D. 28 m

Answer: A

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Examples For Practice 2 Mark Questions

1. If $\sin \theta = \frac{60}{61}$ then find $\cos \theta$ and $\tan \theta$.

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2. If $\tan \theta = \frac{40}{9}$, then find $\sec \theta$ and $\cos \theta$.

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3. If $x = a \sin \theta$ and $y = b \cos \theta$, then prove : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

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4. Prove: $\cos ec \theta \sqrt{1 - \cos^2 \theta} = 1$

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5. What is the value of $\cot^2 \theta - \frac{1}{\sin^2 \theta}$?

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6. If $\cot \theta = \frac{24}{7}$, then find $\cos ec \theta$ and $\sin \theta$.

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7. If $\sec \theta = \frac{25}{7}$ then find the value of $\tan \theta$.



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8. Solve the following activity and find the value of

$$6 \tan^2 \theta - \frac{6}{\cos^2 \theta}$$



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Examples For Practice 3 Mark Questions

1. If $\cos \theta = \frac{1}{2}$, find the value of $\frac{2 \sec \theta}{1 + \tan^2 \theta}$



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



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3. Prove that :

$$\frac{\sin \theta}{1 - \cos \theta} = \operatorname{cosec} \theta + \cot \theta$$



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4. Prove the following trigonometric identities:

$$\tan \theta - \cot \theta = \frac{2 \sin^2 \theta - 1}{\sin \theta \cos \theta}$$



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5. Prove the following trigonometric identities:

$$\frac{\tan \theta + \sin \theta}{\tan \theta - \sin \theta} = \frac{\sec \theta + 1}{\sec \theta - 1}$$



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6. Prove : $(1 + \tan^2 \theta)(1 + \sin \theta)(1 - \sin \theta) = 1$.



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7. When observer at a distance of $12m$ from a tree looks at the top of the tree, the angle of elevation is 60° . What is the height of the tree?

$$(\sqrt{3} = 1.73)$$



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Examples For Practice 4 Mark Questions

1. If $\tan \theta = \frac{12}{5}$, find the value of $\frac{1 + \sin \theta}{1 - \sin \theta}$

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2. If $\sin \theta = \frac{3}{5}$, find the values of other trigonometric ratios.

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3. Prove each of the following identities :

$$\frac{\sin \theta}{(1 + \cos \theta)} + \frac{(1 + \cos \theta)}{\sin \theta} = 2\operatorname{cosec} \theta$$

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4. Prove that

$$\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}.$$



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5. 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 retreats 20m from the bank, he finds the angle to be 30° . Find the height of the tree and the breadth of the river.



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6. As observed from the top of a light house, 100m above sea level, the angle of depression of a ship, sailing directly towards

it, changes from 30° to 45° . Determine the distance travelled by the ship during the period of observation.



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



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8. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depres



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9. Prove that

$$\frac{1 + \sin x - \cos x}{1 + \sin x + \cos x} + \frac{1 + \sin x + \cos x}{1 + \sin x - \cos x} = 2 \operatorname{cosec} x$$

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10. Eliminate θ , if $x = 3$

$$\operatorname{cosec} \theta + 4 \cot \theta, y = 4 \operatorname{cosec} \theta - 3 \cot \theta.$$

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Practice Set 1

1. If $\sin \theta = \frac{7}{25}$, find the values of $\cos \theta$ and $\tan \theta$.

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2. If $\tan \theta = \frac{3}{4}$ then find the values of $\sec \theta$ and $\cos \theta$

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3. If $\cot \theta = \frac{40}{9}$, find the values of $\cos \theta$ and $\sin \theta$.

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4. If $5 \sec \theta - 12 \cos \theta = 0$, find the values of $\sec \theta$, $\cos \theta$ and $\sin \theta$.

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5. If $\tan \theta = 1$, find the value of $\frac{\sin \theta + \cos \theta}{\sec \theta + \csc \theta}$.



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6. Prove that:

$$\frac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta.$$



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7. Prove that:

$$\cos^2 \theta (1 + \tan^2 \theta) = 1.$$



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8. Prove that:

$$\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta.$$



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9. Prove that:

$$(\sec \theta - \cos \theta)(\cot \theta + \tan \theta) = \tan \theta \sec \theta.$$



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10. Prove that:

$$\cot \theta + \tan \theta = \cos \theta \sec \theta.$$



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11. Prove that: $\frac{1}{\sec \theta - \tan \theta} = \sec \theta + \tan \theta$.



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12. Prove that:

$$\sin^4 \theta - \cos^4 \theta = 1 - 2 \cos^2 \theta.$$



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13. Prove that:

$$\sec \theta + \tan \theta = \frac{\cos \theta}{1 - \sin \theta}.$$



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14. If $\tan \theta + \frac{1}{\tan \theta} = 2$, then show that $\tan^2 \theta = \frac{1}{\tan^2 \theta} =$



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15. Prove that:
$$\frac{\tan A}{(1 + \tan^2 A)^2} + \frac{\cot A}{(1 + \cot^2 A)^2} = \sin A \cos A$$

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16. Prove that:

$$\sec^4 A (1 - \sin^4 A) - 2 \tan^2 A = 1.$$

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17. Prove:
$$\frac{\tan \theta}{\sec \theta - 1} = \frac{\tan \theta + \sec \theta + 1}{\tan \theta + \sec \theta - 1}$$

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Practice Set 2

1. A person is standing at a distance of $80m$ from the church looking at its top. The angle of elevation is 45° . The height of the church is.



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2. From the top of a lighthouse, an observer looking at a boat makes an angle of depression of 60° . If the height of the lighthouse is $90m$, then find how far is the boat from the lighthouse.

$$(\sqrt{3} = 1.73)$$



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3. Two buildings are facing each other on either side of a road of width 12m. From the top of the first building, which is 10m. High, the angle of elevation of the top of the second is 60° . What is the height of the second building?



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4. Two poles of heights 18 meter and 7 meter are erected on a ground. The length of the wire fastened at their tops is 22 meter. Find the angle made by the wire with the horizontal.



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5. A storm broke a tree and the treetop rested 20 m from the base of the tree, making an angle of 60° with the horizontal. Find the height of the tree.



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6. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60° . Find the length of the string, assuming that there is no slack in the string.



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Problem Set 6

1. The correct alternative answer for each of the following questions :

$$\sin \theta \operatorname{cosec} \theta = ?$$

A. 1

B. 0

C. $\frac{1}{2}$

D. $\sqrt{2}$

Answer: (A)



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2. The correct alternative answer for each of the following questions : $\sec 45^\circ = ?$

A. $\frac{1}{\sqrt{2}}$

B. $\sqrt{2}$

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

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

Answer: (B)



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3. The correct alternative answer for each of the following questions : $1 + \tan^2 \theta = ?$

A. $\cot^2 \theta$

B. $\cos ec^2 \theta$

C. $\sec^2 \theta$

D. $\tan^2 \theta$

Answer: (C)



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4. When we see at a higher level, from the horizontal line, angle formed is..

- A. angle fo elevation
- B. angle of depression
- C. 0
- D. straight

Answer: (A)



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5. If $\sin \theta = \frac{11}{61}$, ffind the value of $\cos \theta$ using trigonometric identity.



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6. If $\tan \theta = 2$. Find the value of other trigonometric ratios.

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7. If $\sec \theta = \frac{13}{12}$, find the values of other trigonometric ratios.

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8. Prove each of the following identities :

$$(i) \sec \theta (1 - \sin \theta) (\sec \theta + \tan \theta) = 1$$

$$(ii) \sin \theta (1 + \tan \theta) + \cos \theta (1 + \cot \theta) = (\sec \theta + \operatorname{cosec} \theta)$$

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9. Prove : $(\sec \theta + \tan \theta)(1 - \sin \theta) = \cos \theta$.



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10. Prove the following:

$$\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \times \operatorname{cosec}^2 \theta$$



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11. Prove the following:

$$\cot^2 \theta - \tan^2 \theta = \operatorname{cosec}^2 \theta - \sec^2 \theta$$



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12. Prove the following identity:

$$\sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$$



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13. Prove the following:

$$\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} = 2 \sec^2 \theta$$



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14. Prove the following:

$$\sec^6 x - \tan^6 x = 1 + 3 \sec^2 x \times \tan^2 x$$



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15. Prove that :

$$\frac{\tan \theta}{\sec \theta + 1} = \frac{\sec \theta - 1}{\tan \theta}$$



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16. Prove the following:

$$\frac{\tan^3 \theta - 1}{\tan \theta - 1} = \sec^2 \theta + \tan \theta$$



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17. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$, using the identity $\sec^2 \theta = 1 + \tan^2 \theta$



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18. A boy standing at a distance of 48 meters from a building observes the top of the building and makes an angle of elevation of 30° . Find the height of the building .



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19. From the top of a lighthouse , an observer looks at a ship and finds the angle of depression to be 30° . If the height of the lighthouse is 100m, then find how far is that ship from the lighthouse.



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20. Two buildings are in front of each other on a road of width 15 meters. Form the top of the first building, having a height of

12 meter, the angle of elevation of the top of the second building is 30° . What is the height of the second building?



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21. A ladder on the platform of a firebrigade van can be elevated at an angle of 70° to the maximum. The length of the ladder can be extended upto $20m$. If the platform is $2m$ above the ground, find the maximum height from the ground upto which the ladder can reach ($\sin 70^\circ = 0.94$)



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22. While landing at an airport, a pilot made an angle of depression of 20° . Average speed of the plane was $200km/h$. The plane reached the ground after 54 seconds. Find the

height at which the plane was when it started landing.

$$(\sin 20^\circ = 0.342)$$



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Challenging Questions

1. If $3 \tan \theta = \sec \theta$, then find the value of $\cot \theta$.



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2. Prove:

$$(1 - \cos^2 A) \cdot \sec^2 B + \tan^2 B(1 - \sin^2 A) = \sin^2 A + \tan^2 B$$

.



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3. If P is the circumcentre of an acute angled triangle ABC with circumradius R. D is the midpoint of BC. Show that the perimeter of $\triangle ABC = 2R(\sin A + \sin B + \sin C)$.



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4. When one looks from the foot and the top of a tower from the roof of a building, the angles of elevation and depression are of 63° and 27° respectively. If the height of the building is 20 metres, find the height of the tower. ($\tan 63^\circ = 2$)



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5. Two pillars of equal height stand on either side of a roadway which is 120 m wide. At a point in the road between the pillars,

the angles of elevation of the pillars are 60° and 30° . Find the height of each pillars to the nearest metre and position of the point from both the pillars.



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6. An aeroplane when flying at a height of 4000m from the ground passes vertically above another aeroplane at an instant when the angles of the elevation of the two planes from the same point on the ground are 60° & 45° respectively. Find the vertical distance between the aeroplanes at that instant.



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