



## MATHS

### BOOKS - UNIQUE MATHS (HINGLISH)

### TRIGONOMETRY

#### Practice Test 6 1

1. If  $\sin \theta = \frac{7}{25}$ , find the vales 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  $\cos ec\theta$  and  $\sin \theta$ .

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

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

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6. Prove that:

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



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7. Prove that:

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



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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.  $\tan \theta + \frac{1}{\tan \theta} = 2$  then prove that  $\tan^2 \theta + \frac{1}{\tan^2 \theta} = 2$



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15. Prove that:

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

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



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2. From the top of a lighthouse, an observer looking at a boat makes an angle of depression of  $60^\circ$ . 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  $60^\circ$ . 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  $60^\circ$  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  $60^\circ$ . Find the length of the string, assuming that there is no slack in the string.



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## Problem Set

1.  $\sin \theta \cdot \cos e\theta = ?$

A. 1

B. 0

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

D.  $\sqrt{2}$

**Answer: A**



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

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

B.  $\sqrt{2}$

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

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

**Answer: B**



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**3.**  $1 + \tan^2 \theta = ?$

A.  $\cot^2 \theta$

B.  $\cos^2 \theta$

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 of elevation
- B. Angle of depression
- C. Straight angle
- D. Angle of elevation

**Answer: A**



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



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



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

A. q

B.

C.

D.

**Answer:**  $\sin \theta = \frac{5}{13}$



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8. Prove that :

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



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9. Prove that

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



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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:

$$\cot^2 \theta - \tan^2 \theta = \cos^2 \theta - \sec^2 \theta$$



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12. Prove that :

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



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13. Prove that

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



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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

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



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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  $30^\circ$ . Find the height of the building .



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19. From the top of a lighthouse, an observer looking at a boat makes an angle of depression of  $60^\circ$ . 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.** Two building are facing each other on a road of width 15 metre. From the top of the first building, which is 12m hight, the angle of elevation of the top of the second is found to be  $30^\circ$ . 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 angel of  $70^\circ$  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  $20^\circ$ . 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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**Hots Solved**

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



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3. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is  $60^\circ$ . When he moves 40 m away from the bank, he finds the angle of elevation to be  $30^\circ$ . Find the height of the tree and the width of the river. ( $\sqrt{3} = 1.73$ )

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4. The angle of elevation of cloud from a point 60 m above a lake is  $30^\circ$  and the angle of depression of the reflection of cloud in the lake is  $60^\circ$ . Find the height of the cloud.

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5. 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  $30^\circ$ , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be  $60^\circ$ . Find the time taken by the car to reach the foot of the tower from this point

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6. A man on a cliff observes a boat at an angle of depression  $30^\circ$  which is sailing towards the shore to the point immediately beneath him. Three minutes later the angle of depression of the boat is found to be  $60^\circ$ . Assuming that the boat sails at a uniform speed, determine how much more time it will take to reach the shore.



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7. A bird was flying in a line parallel to the ground from north to south at a height of 2000 metres. Tom, standing in the middle of the field, first he observed the bird in the north at an angle of  $30^\circ$ . After 3 min, he again observed in the south at an angle of  $45^\circ$ . find the speed of the bird in km per hour.

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



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8. In a right angled triangle  $ABC$ ,  $m\angle A = 90^\circ$  and the value of

$$\frac{5 \sin^2 B + 7 \cos^2 C + 4}{3 + 8 \tan^2 60} = \frac{7}{27} . \text{ Find the perimeter of}$$

$\triangle ABC$  if  $AC = 3$



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9. Prove that

$$(\sin \theta + \cos \theta)(\cos ec\theta - \sec \theta) = \cos ec\theta . \sec \theta - 2 \tan \theta$$



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Unique Practice Session

1. The value of  $\cos 90^\circ$  is .....

A.  $-1$

B.  $1$

C.  $0$

D. Not defined

**Answer: C**



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2. If  $\sqrt{3} \tan \theta = 3 \sin \theta$ , the value of  $\sec \theta$  is .....

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

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



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

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

**Answer:**



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3. If  $\sin x = \frac{3}{4}$ , then  $\cos x = ?$

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

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

C.  $\frac{\sqrt{7}}{4}$

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

**Answer: C**



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4.  $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = ?$

A.  $\sec^2 \theta$

B.  $2 \sec^2 \theta$

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

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

**Answer: B**



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5. If  $\cos \theta = \frac{1}{\sqrt{2}}$  then  $\theta$

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer: B**



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6. If  $\cos A = \frac{4}{5}$  then  $\tan A = ?$

A.  $\frac{3}{5}$

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

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

D.  $\frac{5}{3}$

**Answer: B**



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7. If a pole height 6m casts a shadow  $2\sqrt{3}$ m long on the ground, then the sun's elevation is

A.  $60^\circ$

B.  $45^\circ$

C.  $30^\circ$

D.  $90^\circ$

**Answer: C**



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8. if  $\sin \theta = \frac{5}{13}$ , find the value of  $\cos \theta$

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9. Write the maximum and minimum values of  $\cos \theta$  .

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10. If  $\tan A = \frac{3}{4}$  and  $A + B = 90^\circ$  , then what is the value of  $\cot B$  ?

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11. Write the value of  $\cot^2 \theta - \frac{1}{\sin^2 \theta}$  .

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12. If  $\sin \theta = \frac{4}{5}$ , what is the value of  $\cot \theta + \operatorname{cosec} \theta = ?$



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



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14. What is the value of  
 $(1 + \tan^2 \theta)(1 - \sin \theta)(1 + \sin \theta) = ?$



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15. If  $\cos A = \frac{7}{25}$ , find the value of  $\tan A + \cot A$ .



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16. If  $\sin \theta = \frac{20}{29}$ , then find the value of  $\cos \theta$ .



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



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18. Prove that

$$\sqrt{\sec^2 \theta + \operatorname{cosec}^2 \theta} = \tan \theta + \cot \theta.$$



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19. If  $\sin \theta + \sin^2 \theta = 1$ , prove that  $\cos^2 \theta + \cos^4 \theta = 1$

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20. Prove:  $\frac{\cos \theta}{1 - \sin \theta} = \frac{1 + \sin \theta}{\cos \theta}$

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21. सिद्ध कीजिए कि :  $\sin^2 \theta + \cos^4 \theta = \cos^2 \theta + \sin^4 \theta$

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22. If  $\tan \theta = \frac{4}{5}$ , find the value of  $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta}$ .

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23. If  $\sec \theta - \cot \theta = \alpha$ , write the value of  $\sec \theta + \cot \alpha$



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



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25. त्रिकोणमितीय सर्वसमिकाओं को सिद्ध करो :

$$\frac{1}{\sec A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\sec A + \cot A}$$



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



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**27.** The length of the shadow of a tower standing on level plane is found to be  $2x$  metres longer when the sun's altitude is  $30^\circ$  than when it was  $45^\circ$ . Prove that the height of tower is  $x(\sqrt{3} + 1)$  metres.

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**28.** A circus artist is climbing from the ground along a rope stretched from the top of a vertical pole and tied at the ground. The height of the pole is 12 m and the angle made by the rope with ground level is  $30^\circ$ . Calculate the distance covered by the artist in climbing to the top of the pole.

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**29.** An observer at a distance of 10 m from a tree looks at the top of the tree , the angle of elevation is  $60^\circ$  . What is the height of the tree ? ( $\sqrt{3} = 1.73$ )



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**30.** From the top of a building , an observer is looking at a scooter parked at some distance away , makes an angle of depression of  $30^\circ$  . If the height of the building is 40 m , find how far the scooter is from the building. ( $\sqrt{3} = 1.73$ )



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**31.** The angle of elevation of a jet plane from a point A on the ground is  $60^\circ$  . After and flight of 30 seconds, the angle of

elevation changes to  $30^\circ$ . If the jet plane is flying at a constant height of  $3600\sqrt{3}m$ , find the speed of the jet plane.



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**32.** Prove that :

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



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**33.** Prove that

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



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34. Prove that

$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$

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35. Prove that: 
$$\frac{\sec \theta - 1}{\sec \theta + 1} = \left(\frac{\sin \theta}{1 + \cos \theta}\right)^2$$

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36. Two buildings are in front of each other on either side of a road of width 10 metres. From the top of the first building which is 30 metres high, the angle of elevation to the top of the second is  $45^\circ$ . What is the height of the second building?

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



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



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39. Eliminate  $\theta$  if  $x = a \cot \theta - b \operatorname{cosec} \theta$  and  $y = a \cot \theta + b \operatorname{cosec} \theta$ .

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

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41. Roshani saw an eagle on the top of a tree at an angle of elevation of  $61^\circ$ , 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  $52^\circ$ .

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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**42.** A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle of  $30^\circ$  with the ground. The distance between the foot of the tree to the point where the top touches the ground is 10m. Find the height of the tree.



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## Assignment

1. If  $\sin x = \frac{3}{4}$ , then  $\cos x = ?$



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

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

C.  $\frac{\sqrt{7}}{4}$

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

**Answer:**



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2. If  $\cos A = \frac{4}{5}$ , then the value of  $\tan A$  is

A.  $\frac{3}{5}$

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

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

D.  $\frac{5}{3}$

**Answer:**



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**3. Prove that:**

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



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**4. Complete the relation in ratios given below .**

$$(i) \frac{\sin \theta}{\cos \theta} = \square$$

$$(ii) \sin \theta = \cos(90 - \square)$$

$$(iii) \cos \theta = \sin(90 - \square)$$

$$(iv) \tan \theta \times \tan(90 - \theta) = \square$$



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5. Complete the equation

$$\sin^2 \theta + \cos^2 \theta =$$



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6. Write the values of the following trigonometric ratios

$$(i) \sin 30^\circ = \frac{1}{\square}$$

$$(ii) \cos 30^\circ = \frac{\square}{\square}$$

$$(iii) \tan 30^\circ = \frac{\square}{\square}$$

$$(iv) \sin 60^\circ = \frac{\square}{\square}$$

$$(v) \cos 45^\circ = \frac{\square}{\square}$$

$$(vi) \tan 45^\circ = \square$$



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7. A ladder on the platform of a firebrigade van can be elevated at an angle of  $70^\circ$  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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8. Prove that:  $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

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9.  $\tan \theta + \frac{1}{\tan \theta} = 2$  then prove that  $\tan^2 \theta + \frac{1}{\tan^2 \theta} = 2$

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10. 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  $30^\circ$ , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depres



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$$\frac{1 + \sin x - \cos x}{1 + \sin x + \cos x} + \frac{1 + \sin x + \cos x}{1 + \sin x - \cos x}$$

$$= 2 \operatorname{cosec} x$$



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12. Prove the following:

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



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