



MATHS

BOOKS - TARGET MATHS (HINGLISH)

TRIGONOMETRY

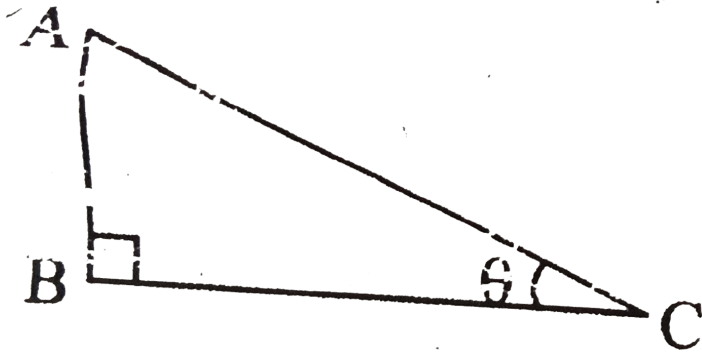
Example

1. Fill in the blanks with reference to the figure given below .

i. $\sin \theta =$

ii. $\cos \theta =$

iii. $\tan \theta =$



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2. Complete the relations in ratios given below .

i. $\frac{\sin \theta}{\cos \theta} =$

ii. $\sin \theta =$

iii. $\cos \theta =$

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

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3. Complete the equation.

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

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4. Write the values of the following trigonometric ratios .

i. $\sin 30^\circ =$

ii. $\cos 30^\circ =$

iii. $\tan 30^\circ =$

iv. $\sin 60^\circ =$

v. $\cos 45^\circ =$

vi. $\tan 45^\circ =$

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1. If $\sin \theta = \frac{7}{25}$ and $\cos \theta = \frac{24}{25}$, then find $\tan \theta$.



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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 $\tan \theta = 1$, then $\frac{\sin \theta + \cos \theta}{\sec \theta + \operatorname{cosec} \theta} =$

A. 1

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

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

D. 0

Answer: B



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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:

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



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9. Prove that: $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sec \theta - \tan \theta$
for $\theta \in \left(\frac{\pi}{2}, \pi \right)$



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10. Prove that:

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



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11. Prove that

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

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



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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 :

$$\sec \theta + \tan \theta =$$

A. $\frac{1}{1 + \sin \theta}$

B. $\frac{1}{1 - \sin \theta}$

C. $\frac{\cos \theta}{1 + \sin \theta}$

D. $\frac{\cos \theta}{1 - \sin \theta}$

Answer: D



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

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

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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° . 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° . 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 sl



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Problem Set 6

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

A. 1

B. 0

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

D. $\sqrt{2}$

Answer: A



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2. $\cos ec 45^\circ = \dots\dots$

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. $\cos ec^2 \theta$

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

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.



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8. Prove that :

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



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



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



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11. Prove : $\cot^2 \theta - \tan^2 \theta = \operatorname{cosec}^2 \theta - \sec^2 \theta$



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



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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° . 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. From 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 $200\text{km}/\text{h}$.

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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Activities For Practice

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

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



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



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Multiple Choice Questions

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

A. 0

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

C. 1

D. $\sqrt{2}$

Answer: C



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2. $\tan \theta \cdot \tan(90^\circ - \theta) =$

A. 0

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

C. 1

D. $\sqrt{3}$

Answer: C



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3. Choose the correct answer in each of the following questions:

If $\cos \theta = \frac{4}{5}$ then $\tan \theta = ?$

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

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

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

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

Answer: B



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4. If $\cot \theta = \frac{7}{8}$, then $\tan^2 \theta =$

A. $\frac{7}{8}$

B. $\frac{8}{7}$

C. $\frac{49}{64}$

D. $\frac{64}{49}$

Answer: D



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5. If $\tan \theta = \frac{4}{3}$, then $3 \sin \theta - 4 \cos \theta =$

A. 0

B. 1

C. $\frac{4}{5}$

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

Answer: A



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6. Which of the following is the value of $\sec 30^\circ$?

A. $\sqrt{3}$

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

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

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

Answer: D



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

A. $\sin 30^\circ$

B. $\sin 60^\circ$

C. $\cos 60^\circ$

D. $\tan 60^\circ$

Answer: B

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8. $\frac{1 - \cot^2 45^\circ}{1 + \cot^2 45^\circ} =$

A. $\cos 90^\circ$

B. $\sin 90^\circ$

C. $\sin 45^\circ$

D. $\cos 45^\circ$

Answer: A



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9. $1 + \cot^2 \theta = \dots$

A. $\sec^2 \theta$

B. $\cos^2 \theta$

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

D. $\tan^2 \theta$

Answer: C



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10. $\tan^2(90^\circ - \theta) - \operatorname{cosec}^2\theta =$

A. 0

B. 1

C. -1

D. 2

Answer: C



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11. If $\cos \theta = \frac{24}{25}$, then the value of $\sin \theta$ is

A. $\frac{7}{24}$

B. $\frac{7}{25}$

C. $\frac{25}{7}$

D. $\frac{24}{7}$

Answer: B



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12. If $\tan \theta = \frac{3}{4}$, then $\cos^2 \theta - \sin^2 \theta = \frac{7}{25}$ (b) 1 (c) $-\frac{7}{25}$ (d) $\frac{4}{25}$

A. $\frac{3}{25}$

B. $\frac{4}{25}$

C. $\frac{7}{25}$

D. $\frac{9}{25}$

Answer: C



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13. If $\cot \theta = \frac{3}{4}$, then $\frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta} =$

A. $\frac{1}{7}$

B. $\frac{2}{7}$

C. $\frac{1}{4}$

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

Answer: A



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14. Find the value of $\frac{1 + \tan^2 \theta}{1 + \cot^2 \theta}$

A. $\sec^2 \theta$

B. $\cos^2 \theta$

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

D. $\sin^2 \theta$

Answer: C



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15. $(1 - \cos^2 \theta) \cot^2 \theta$

A. $\sec^2 \theta$

B. $\cos^2 \theta$

C. $\cos \operatorname{csc}^2 \theta$

D. $\sin^2 \theta$

Answer: B



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16. $\sec^2 \theta - \frac{1}{\cos \operatorname{csc}^2 \theta - 1} =$

A. 0

B. 1

C. $2\sec^2 \theta$

D. $2 \cos \operatorname{csc}^2 \theta$

Answer: B



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17. Write the value of $\operatorname{cosec}^2 \theta (1 + \cos \theta)(1 - \sin \theta)$.

A. 0

B. 1

C. $\sec^2 \theta$

D. $\sin^2 \theta$

Answer: B



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18. $\frac{5}{\cot^2 \theta} - \frac{5}{\cos^2 \theta} =$

A. 5

B. $\frac{1}{5}$

C. -5

D. $-\frac{1}{5}$

Answer: C



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19. $\frac{\sin \theta}{1 + \cos \theta} =$

A. $\frac{\cos \theta}{1 - \sin \theta}$

B. $\frac{1 - \cos \theta}{\sin \theta}$

C. $\frac{1 - \sin \theta}{\cos \theta}$

D. $\frac{1 - \cos \theta}{1 + \cos \theta}$

Answer: B



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20. If $\cos ec\theta - \cot \theta = \frac{1}{3}$, then $\cos ec\theta + \cot \theta =$

A. 1

B. 2

C. 3

D. 4

Answer: C



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21. If $\sin \theta + \sin^2 \theta = 1$ then $\cos^2 \theta + \cos^4 \theta$ is equal to

A. 0

B. 1

C. -1

D. 2

Answer: B



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22. If $\sin \theta + \cos \theta = m$ and $\sin \theta - \cos \theta = n$, then

A. $m^2 + n^2 = 1$

B. $m^2 - n^2 = 1$

C. $m^2 + n^2 = 2$

D. $m^2 - n^2 = 2$

Answer: C



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23. When we see below the horizontal line , then the angle formed is

- A. A Zero degree angle
- B. the angle of depression
- C. the angle of elevation
- D. a straight angle

Answer: B



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24. If a pole 12 m high casts a shadow $4\sqrt{3}m$ long on the ground then the sun's elevation is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C



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25. A kite is flying at a height 80 m above the ground . The string of the kite which is temporarily attached to the ground

makes an angle 45° with the ground. If there is no slack in the string, then the length of the string is

A. 40 m

B. $40\sqrt{2}$

C. 80 m

D. $80\sqrt{2}$

Answer: D



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26. The angle of elevation of top of the tower from a point P on the ground is 30° . If the points is 45 m away from the foot of the tower, then the height of the tower is

A. 45 m

B. 15 m

C. $15\sqrt{3}$

D. $20\sqrt{3}m$

Answer: C



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27. The angle of depression of a ship as observed from the top of a lighthouse is 45° . If the height of the lighthouse is 200 m , then what is the distance of the ship from the foot of the lighthouse ?

A. 200 m

B. 400 m

C. 100 m

D. $200\sqrt{3}m$

Answer: A

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Additional Problems For Practice Based On Practice Set 6 1

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

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2. If $\sin \theta = \frac{8}{17}$, where θ is an acute angle, find the value of $\cos \theta$ by using identities.

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3. If $\cos \theta = \frac{3}{5}$, where ' θ ' is an acute angle. Find the value of $\sin \theta$.

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

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5. If $\cot \theta = \frac{8}{15}$ then find the values of $\sin \theta$ and $\sec \theta$.

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6. If $\sin \theta = \frac{5}{13}$, where θ is an acute angle, find the values of other trigonometric ratios using identities.



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7. If $\tan \theta = \frac{20}{21}$, then find the values of other trigonometric ratios .



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



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9. If $3 \sin \theta - 4 \cos \theta = 0$, then find the values of $\tan \theta$, $\sec \theta$ and $\operatorname{cosec} \theta$.



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

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

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12. Prove that :

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

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13. Prove that :

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



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14. Prove that : $\sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} = \operatorname{cosec} \theta + \cot \theta$



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15. Prove the trigonometric identities:

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



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



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17. Prove that :

$$\sec^2 \theta - \cos^2 \theta = \sin^2 \theta (\sec^2 \theta + 1)$$



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18. Prove that :

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



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19. Prove that $\sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$



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20. Prove that :

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



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$$21. \frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$$



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$$22. \frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$$



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23. Prove that :

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



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24. 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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25. Eliminate α , if $x = r \cos \alpha$, $y = r \sin \alpha$.



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26. Eliminate θ from the equation $a = x \sec \theta$ and $b = y \tan \theta$.



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27. Eliminate θ if $x = a \cot \theta - b \cos e c \theta$ and
 $y = a \cot \theta + b \cos e c \theta$.

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Based On Practice Set 6 2

1. An observer at a distance of 10 m 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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2. 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° . 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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3. From the top of the lighthouse , an observer looks at a ship and finds the angle of depression to be 60° . IF the height of the lighthouse is 84 metre , then find how far is the ship from the lighthouse ? ($\sqrt{3} = 1.73$)



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4. A person observed the angle of elevation of the top of a tower as 30° . He walked 50m towards the foot of the tower along level ground and found the angle of elevation of the top of the tower as 60° . Find the height of the tower.



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5. 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° . When he moves 40 m away from the bank, he finds the angle of elevation to be 30° . Find the height of the tree and the width of the river. ($\sqrt{3} = 1.73$)



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6. 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. ($\tan 61^\circ = 1.8, 35^\circ = 0.7$)



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7. 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° . What is the height of the second building?



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8. The horizontal distance between two poles is 15m. The angle of depression of the top of the first pole as seen from the top of the second pole is 30° . If the height of the second pole is 24 m, find the height of the first pole. ($\sqrt{3} = 1.732$)

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9. 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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10. From the top of a building 60m high the angles of depression of the top and the bottom of a tower are observed to be 30° and 60° . Find the height of the tower.



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11. A ship of height 24 m is sighted from a lighthouse. From the top of the lighthouse the angle of depression to the top of the mast and base of the ship is 30° and 45° respectively. How far is the ship from the lighthouse? ($\sqrt{3} = 1.73$)



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12. 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° 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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13. A tree is broken by the wind. The top of that tree struck the ground at an angle of 30° and at a distance of 30 m from the root. Find the height of the whole tree. ($\sqrt{3} = 1.73$)

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Chapter Assessment

1. $\cot 60^\circ =$

A. $\sqrt{3}$

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

C. $\sqrt{2}$

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

Answer: B



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2. $\tan \theta \cdot \cot \theta =$

A. 0

B. $\sqrt{3}$

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

D. 1

Answer: D



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3. When we see at a lower level , from the horizontal line , angle formed is

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

Answer: B



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4. $9 \sec^2 A - 9 \tan^2 A =$

A. 0

B. 3

C. -9

D. 9

Answer: D



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5. If the distance of a point from the tower is equal to the height of the tower , then find the angle of elevation of the top of the tower from that point .

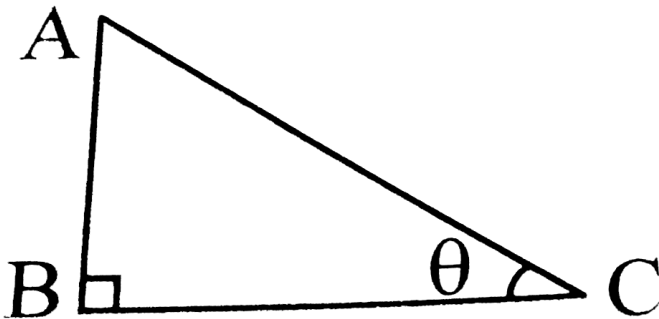


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6. If $\cos \theta = \frac{13}{12}$, then find the values of $\cot \theta$ and $\sin \theta$.

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7. Prove the identity $\sin^2 \theta + \cos^2 \theta = 1$ with the help of given figure .



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8. A person standing at a distance of 90 m from a church observes the angle of elevation of its top to be 45° . Find the height of the church.

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9.
$$\frac{\tan \theta + \sin \theta}{\tan \theta - \sin \theta} = \frac{\sec \theta + 1}{\sec \theta - 1}$$

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10. If $\cos \theta + \frac{1}{\cos \theta} = 4$, then prove that $\cos^2 \theta + \frac{1}{\cos^2 \theta} = 14$.

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11. Prove the following:

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



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12. 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 60° with the ground . The distance from the foot of the tree to the point where the top touches the ground is 5 metres . Find the height of the tree. ($\sqrt{3} = 1.73$)



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13. Two buildings are in front of each other on a road of width 15 meters. From 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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14. If $\tan \theta = 1$, then find the value of $\frac{\sin \theta + \cos \theta}{\sec \theta + \operatorname{cosec} \theta}$.



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15. 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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16. If $\sin \theta + \tan \theta = P$ then prove that $\frac{p^2 - 1}{p^2 + 1} = \sin \theta$



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17. If $3 \tan^2 \theta - 4\sqrt{3} \tan \theta + 3 = 0$, find the acute angle θ .



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



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