



MATHS

NCERT - NCERT Maths(KANNADA)

TRIGONOMETRY

Example

1. If $\tan A = \frac{3}{4}$, then find the other trigonometric ratio of angle A.

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2. If $\angle A$ and $\angle P$ are acute angles such that $\sin A = \sin P$ then prove that $\angle A = \angle P$

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3. Consider a triangle PQR ,right at R ,in which PQ = 29 units ,QR =21 units and $\angle PQR = \theta$, then find the values of

(i) $\cos^2 \theta + \sin^2 \theta$ and (ii) $\cos^2 \theta - \sin^2 \theta$

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4. In $\triangle ABC$, right angle is at B,AB = 5cm and $\angle ACB = 30^\circ$

Determine the lengths of the sides BC and AC.

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5. A chord of a circle of radius 6cm is making an angle 60° at the centre.Find the length of the chord.

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6. In $\triangle PQR$, right angle is at Q, $PQ = 3\text{cm}$ and $PR = 6\text{cm}$. Determine $\angle QPR$ and $\angle PRQ$.

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7. If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, where $0^\circ < A + B \leq 90^\circ$ and $A > B$ find A and B.

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8. Evaluate $\frac{\sec 35^\circ}{\cos 55^\circ}$.

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9. If $\cos 7A = \sin(A - 6^\circ)$, where $7A$ is an acute angle, find the value of A.

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10. If $\sin A = \cos B$, then prove that $A+B = 90^\circ$

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11. Express $\sin 81^\circ + \tan 81^\circ$ in terms of trigonometric ratio of angles between 0° and 45°

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12. If A, B and C are interior angles of a triangle ABC, then show that

$$\sin\left(\frac{B+C}{2}\right) = \cos \frac{A}{2}$$

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13. Show that $\cot \theta + \tan \theta = \sec \theta \cos e\theta$

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14. Show that $\tan^2 \theta + \tan^4 \theta = \sec^4 \theta - \sec^2 \theta$

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15. Prove that $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \operatorname{cosec} \theta - \cot \theta, 0 \leq \theta \leq 90^\circ$

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Do This

1. Identify "Hypotenuse", "Opposite side" and "Adjacent side" for given triangle.

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2. In triangle XYZ, $\angle Y$ is right angle, $XZ = 17\text{m}$ and $YZ = 15\text{ cm}$ then find

(1) $\sin X$ (ii) $\cos Z$ (iii) $\tan X$

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3. In a triangle PQR with right angle at Q, the value of $\angle P$ is x , $PQ = 7\text{cm}$ and $QR = 24\text{cm}$, then find $\sin x$ and $\cos x$

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4. Find the values of $\operatorname{cosec} 60^\circ$, $\sec 60^\circ$ and $\cot 60^\circ$

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5. If $\sin C = \frac{15}{17}$, then find $\cos C$,

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6. If $\tan x = \frac{5}{12}$, then find $\sec x$.

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7. If $\operatorname{cosec} \theta = \frac{25}{7}$, then find $\cot \theta$

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Try This

1. In a right angle triangle ABC, right angle is at C, $BC+CA = 23$ cm and $BC-CA = 7$ cm ,then find $\sin A \tan B$

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2. Express $\sec A$ and $\cos A$ in terms of sides of right angle triangle



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3. Find the values of $\sin 30^\circ + \cos 30^\circ + \tan 30^\circ + \cot 30^\circ + \sec 30^\circ + \csc 30^\circ$.

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4. Find the values for $\tan 90^\circ$, $\csc 90^\circ$, $\sec 90^\circ$ and $\cot 90^\circ$

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5. Evaluate the following and justify your answer.

(i)
$$\frac{\sin^2 15^\circ + \sin^2 75^\circ}{\cos^2 36^\circ + \cos^2 54^\circ}$$

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6. Evaluate the following and justify your answer.

$$\sin 5^\circ \cos 85^\circ + \cos 5^\circ \sin 85^\circ$$

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7. Evaluate the following and justify your answer.

$$\sec 16^\circ \csc 74^\circ - \cot 74^\circ \tan 16^\circ$$

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Think And Discuss

1. Discuss among your friends

Does $\sin x = \frac{4}{3}$ exist for some value of angle?

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2. Discuss among your friends

The value of $\sin A$ and $\cos A$ is always less than 1, Why?

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3. Discuss among your friends

$\tan A$ is product of \tan and A

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4. Is $\frac{\sin A}{\cos A}$ equal to $\tan A$?

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5. Discuss with your friends about the following conditions:

What can you say about $\operatorname{cosec} 0^\circ = \frac{1}{\sin 0^\circ}$? Is it defined? Why?

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6. Discuss with your friends about the following conditions:

What can you say about $\cot 0^\circ = \frac{1}{\tan 0^\circ}$ Is it defined ? Why ?

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7. Discuss with your friends about the following conditions:

$\sec 0^\circ = 1$ Why?

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8. Observe the above table

What can you say about the values of $\sin A$ and $\cos A$, as the value of angle A increases from 0° to 90° ?

If $A \geq B$ then $\sin A \geq \sin B$, Is the true?

If $A \geq B$, then $\cos A \geq \cos B$, Is it true ? Discuss.

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9. If one of the sides and any other part (either an acute angle or any side) of a right angle triangle is known, the remaining sides and angles of the triangle can be determined. Do you agree? Explain with an example.

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10. For which value of an acute angle θ , (i) $\frac{\cos \theta}{1 - \sin \theta} + \frac{\cos \theta}{1 + \sin \theta} = 4$ is true ?

For which value of $0^\circ \leq \theta \leq 90^\circ$, above equation is not defined?

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11. Are these identities true only for $0^\circ \leq A \leq 90^\circ$? If not, for which other values of A they are true ?

$$\sec^2 A - \tan^2 A = 1$$

$$\cos ec^2 A - \cot^2 A = 1$$

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Exercise 11 1

1. In right angle triangle ABC, 8cm ,15 cm and 17 cm are the length of AB,BC and CA respectively , Then find $\sin A$, $\cos A$ and $\tan A$.

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2. The sides of a right angle triangle PQR are $PQ = 7\text{cm}$, $PR = 25\text{ cm}$ and $\angle Q = 90^\circ$ respectively , Then find $\tan P$ - $\tan R$

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3. In a right angle triangle ABC with right angle at B , in which $a = 24$ units , $b = 25$ units and $\angle BAC = \theta$, then find $\cos A \tan A$ ($A < 90^\circ$)

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4. If $\cos A = \frac{12}{13}$, then find $\sin A$ and $\tan A$ ($A < 90^\circ$)

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5. If $3 \tan A = 4$, then find $\sin A$ and $\cos A$

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6. In $\triangle ABC$ and $\triangle XYZ$, if $\angle A$ and $\angle X$ are acute angles such that $\cos A = \cos X$ then show that $\angle A = \angle X$

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7. Given $\cot \theta = \frac{7}{8}$, then evaluate (i)
 $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$ (ii) $\cot^2 \theta$

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8. In a right angle triangle ABC, right angle is at B ,if $\tan A = \frac{1}{\sqrt{3}}$,
then find the value of

(i)

$$\sin A \cos C + \cos A \sin C$$

$$(ii) \cos A \cos C - \sin A \sin C$$

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Exercise 11 2

1. Evaluate the following

$$\sin 45^\circ + \cos 45^\circ$$

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2. Evaluate the following

$$\frac{\cos 45^\circ}{\sec 30^\circ + \csc 60^\circ}$$

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3. Evaluate the following

$$\frac{\sin 30^\circ + \tan 45^\circ - \csc 60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$$

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4. $2 \tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ = ?$

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5. Evaluate the following

$$\frac{\sec^2 60^\circ - \tan^2 60^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$$

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6. $\frac{2\tan 30^\circ}{1 + \tan^2 45^\circ} =$

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7. $\frac{1 - \tan^2 45^\circ}{1 + \tan^2 45^\circ} = ?$

A. $\tan 90^\circ$

B. 1

C. $\sin 45^\circ$

D. 0

Answer: d

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

A. $\cos 60^\circ$

B. $\sin 60^\circ$

C. $\tan 60^\circ$

D. $\sin 30^\circ$

Answer: c

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9. $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ = ?$

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10. Is it right to say that

$$\cos(60^\circ + 30^\circ) = \cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ$$



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11. In right angle triangle ΔPQR , right angle at Q , $PQ = 6\text{cm}$ and $\angle RPQ = 60^\circ$ Determine the lengths of QR and PR .



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12. In ΔXYZ , right angle is at Y , $YZ = x$, and $XZ = 2x$ Then determine $\angle YXZ$ and $\angle YZX$.



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13. Is it right to say that $\sin(A + B) = \sin A + \sin B$? Justify your answer.



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Exercise 11.3

1. Evaluate

$$\frac{\tan 36^\circ}{\cot 54^\circ}$$



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2. Evaluate

$$\cos 12^\circ - \sin 78^\circ$$



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3. $\cos 31^\circ - \sec 59^\circ = ?$



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4. Evaluate

$$\sin 15^\circ \sec 75^\circ$$



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5. Evaluate

$$\tan 26^\circ \tan 64^\circ$$



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6. Show that

$$\tan 48^\circ \tan 16^\circ \tan 42^\circ \tan 74^\circ = 1$$



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7. Show that

$$\cos 36^\circ \cos 54^\circ - \sin 36^\circ \sin 54^\circ = 0$$



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8. If $\tan 2A = \cot(A - 18^\circ)$ where $2A$ is an acute angle, find the value of A .



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9. If $\tan A = \cot B$, prove that $A + B = 90^\circ$



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10. If A , B and C are interior angles of a triangle ABC , then show that

$$\tan\left(\frac{A + B}{2}\right) = \frac{\cot C}{2}$$



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11. Expression $\sin 75^\circ + \cos 65^\circ$ in terms of trigonometric ratios of angles between 0° and 45°

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Exercise 11 4

1. Evaluate the following

$$(1 + \tan \theta + \sec \theta)(1 + \cos \theta - \operatorname{cosec} \theta)$$

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2. Evaluate the following

$$(\sin \theta + \cos \theta)^2 + (\sin \theta - \cos \theta)^2$$

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3. Evaluate the following

$$(\sec^2 \theta - 1)(\operatorname{cosec}^2 \theta - 1)$$

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4. Show that $(\operatorname{cosec} \theta - \cot \theta)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}$

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5. Show that $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$

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6. Show that $\frac{1 - \tan^2 A}{\cot^2 A - 1} = \tan^2 A$

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7. Show that $\frac{1}{\cos \theta} - \cos \theta = \tan \theta \cdot \sin \theta$

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8. Simplify $\sec A (1 - \sin A)(\sec A + \tan A)$

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9. Prove that

$$(\sin A + \sec A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$$

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10. Simplify $(1 - \cos \theta)(1 + \cos \theta)(1 + \cot^2 \theta)$.

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11. If $\sec \theta + \tan \theta = p$, then find the value of $\sec \theta - \tan \theta$

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12. If $\cos ec\theta + \cot \theta = k$, then prove that $\cos \theta = \frac{k^2 - 1}{k^2 + 1}$

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Optional Exercise

1. Prove that $\frac{\cot \theta - \cos \theta}{\cot \theta + \cos \theta} = \frac{\cos ec\theta - 1}{\cos ec\theta + 1}$

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2. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$ [use the identity $\sec^2 \theta = 1 + \tan^2 \theta$]



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3. Prove that $(\sec A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$

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4. Prove that $\frac{1 + \sec A}{\sec A} = \frac{\sin^2 A}{1 - \cos A}$

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5. Show that $\left(\frac{1 + \tan^2 A}{1 + \cot^2 A}\right) = \left(\frac{1 - \tan A}{1 - \cot A}\right)^2 = \tan^2 A$

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6. Prove that $\frac{(\sec A - 1)}{(\sec A + 1)} = \left(\frac{1 - \cos A}{1 + \cos A}\right)$

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