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MATHS

NCERT - NCERT MATHEMATICS (Bengali)

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 ΔABC , 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 ΔPQR ,right angle is at Q,PQ =3cm and PR =6cm 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 $0^\circ \angle A+B \leq 90^\circ$ and $A>B$ find A and B

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8. Evaluate $\frac{\sec 35^\circ}{\cos ec55^\circ}$

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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 triangle ABC ,then show that sin $\left(\frac{B+C}{2}\right) = \cos\left(\frac{A}{2}\right)$

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

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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 $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \cos ec\theta + \cot\theta, 0 \leq \theta \leq 90^\circ$

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Do This

1. If $x = a\cos\theta$ and $y = b\sin\theta$,find the relation between x and y.

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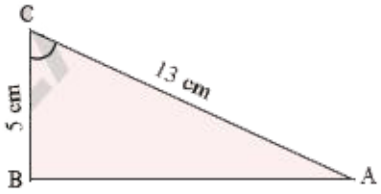
2. Find (i) $\sin C(ii)\cos C$ and $(iii)\tan C$ in the adjacent triangle.



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3. In triangle XYZ, $\angle Y$ is right angle , XZ =17cm and YZ =15 cm then find

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

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4. In a triangle PQR with right angle at Q , the value of $\angle Pisx, PQ = 7cm$ and $QR24cm$, then find sin x and cos x

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5. Find the values of cosec60°, $\sec 60^\circ$ and $\cot 60^\circ$

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

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

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8. If $\cos ec\theta = \frac{25}{7}$, then find $\cot \theta$

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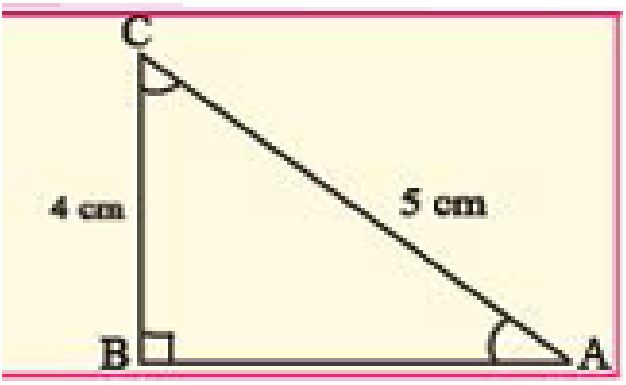
Try This

1. Write length of "Hypotenuse ","Opposite side "and "Adjacent side "for the given angles in the given triangles.

1. Foa angle C

. For angle A



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

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3. Express sec A and cos A in terms of sides of right angle triangle

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4. Find the values of $\sin 30^\circ$, $\cos 30^\circ$, $\tan 30^\circ$, $\cos ec 30^\circ$, $\sec 30^\circ$ and $\cot 30^\circ$ by using the ratio concepts .

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5. Find the values for tan 90°, $\cos ec 90^\circ$, $\sec 90^\circ$ and $\cot 90^\circ$

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6. Evaluate the following and justify your answer.

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

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7. Evaluate the following and justify your answer.

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

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8. Evaluate the following and justify your answer.

$\sec 16^\circ \cos ec74^\circ - \cot 74^\circ \tan 16^\circ$

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Think And Discuss

1. Discuss among your friends

Does $\sin x = \frac{4}{3}$ exists 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. IS $\frac{\cos A}{\sin A}$ equal to cot A ?

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6. Discuss with your friends about the following conditions:

What can you say about $\cos ec0^\circ = \frac{1}{\sin 0^\circ}$? Is the defined ? Why ?

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7. 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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8. Discuss with your friends about the following conditions:

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

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9. Ovserve 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° to90° ?

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

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

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10. Prove that $\frac{1-\tan^2 30^\circ}{1+\tan^2 30^\circ} = \cos 60^\circ$

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11. 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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12. Check and discuss the above relations in the case of angle between 0° and 90° whether they hold for these angles or not?

So,	$\sin(90^\circ - A) = \cos A$		$\cos(90^\circ - A) = \sin A$
	$\tan(90^\circ - A) = \cot A$		$\cot(90^\circ - A) = \tan A$
	$\sec(90^\circ - A) = \text{cosec } A$	and	$\text{cosec}(90^\circ - A) = \sec A$

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13. Prove that $\sin^2 30^\circ + \cos^2 30^\circ = 1$

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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 = 7cm , PR =25 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 sin 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 ΔABC and ΔXYZ, 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) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ $(ii)\frac{(1+\sin\theta)}{\cos\theta}$

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8. In a right angle triangle ABC, right angle is at B ,If tan $A = \sqrt{3}$, 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

$$\frac{\cos 45^\circ}{\sec 30^\circ + \cos ec60^\circ}$$

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3. Evaluate the following

$$\frac{\sin 30^\circ + \tan 45^\circ - \cos ec60^\circ}{\cot 45^\circ + \cos 60^\circ - \sec 30^\circ}$$

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4. Evaluate the following

$$2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$$

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

A. $\sin 60^\circ$

B. $\cos 60^\circ$

C. $\tan 30^\circ$

D. $\sin 30^\circ$

Answer: c

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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. Evaluate $\sin 60^\circ \cos 30^\circ - \sin 30^\circ \cos 60^\circ$, What is the value of $\sin(60^\circ - 30^\circ)$ What can you conclude ?

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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 = 6cm 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. Evaluate

$$\cos ec31^\circ - \sec 59^\circ$$

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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 $= \cot B$ where A and B are acute angles 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 $\tan\left(\frac{A+B}{2}\right) = \cot\left(\frac{C}{2}\right)$

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

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Exercise 11 4

1. Evaluate the following

$$(1+\tan\theta+\sec\theta)(1+\cot\theta-\cos ec\theta)$$

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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

$$\left(\sec^2\theta-1\right)\left(\cos ec^2\theta-1\right)$$

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4. Show that $(\cos ec\theta - \cot\theta)^2 = \dfrac{1-\cos\theta}{1+\cos\theta}$

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

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

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

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

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9. Prove that $(\sin A+\cos ecA)^2+(\cos A+\sec A)^2=7+\tan^2 A+\cot^2 A$

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

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

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

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Optional Exercise

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

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

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

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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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