MATHS

NCERT - NCERT MATHEMATICS(ENGLISH)

INTRODUCTION TO TRIGONOMETRY

Exercise 8 2

1. Evaluate the following

(i) $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$

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

(iii) $\dfrac{\cos 45^\circ}{\sec 30^\circ + cosec 30^\circ}$

(iv) $\dfrac{\sin 30^\circ + \tan 45^\circ - cosec 60^\circ}{\sec 30^\circ + \cos 60^\circ + \cot 45^\circ}$

(v) $\dfrac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$

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2. Choose the correct option and justify your choice :

(i) $\frac{2\tan 30^\circ}{1+\tan^2 30^\circ}$

$(a)\ \sin 60^\circ\ (b)\ \cos 60^\circ\ (c)\ tan60^\circ\ (d)\ \sin 30^\circ$

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3. If $\tan(A+B)=\sqrt{3}$ and $tan(A-B)=\frac{1}{\sqrt{3}}$;

$0^\circ \leq A+B \leq 90^\circ$ and $A \leq B$, find A and B.

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4. State whether the following are true or false. Justify your answer.

(i) $\sin(A+B) = \sin A + \sin B$.

(ii) The value of $\sin\theta$ increases as θ increases.

(iii) The value of $\cos\theta$ increases as θ increases.

(iv) $\sin\theta = \cos\theta$ for all values of θ

(v) $\cot A$ is not defined for $A = 0^\circ$

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Exercise 8 4

1. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(v) $\dfrac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \cos ecA + \cot A$

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2. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(iv) $\frac{1+\sec A}{\sec A}=\frac{\sin^2 A}{1-\cos A}$

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3. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(ix) $(cosec\ A\ \sin A)(\sec A-\cos A)=\frac{1}{\tan A+\cot A}$

[Hint : Simplify LHS and RHS separately]

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4. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(viii)

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

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5. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

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

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6. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(iii) $\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta\cos ec\theta$

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7. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

$$\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2\sec A$$

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8. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(vii) $\frac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}=\tan\theta$

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9. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

(i) $(\cos ec\theta - \cot\theta)^2 = \dfrac{1-\cos\theta}{1+\cos\theta}$

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10. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

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

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11. Express the trigonometric ratios sin A, sec A and tan A in terms of cot A.

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12. Write all the other trigonometric ratios of $\angle A$ in terms of sec A.

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13. Evaluate:

(i) $\dfrac{\sin^2 63^\circ + \sin^2 27^\circ}{\cos^2 17^\circ + \cos^2 73^\circ}$

(ii) $\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ$

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14. Choose the correct option. Justify your choice.

(i) $9\sec^2 A - 9\tan^2 A =$

(a) 1 (b) 9 (c) 8 (d) 0

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Solved Examples

1. Prove that $secA(1 - \sin A)(secA + tanA) = 1$

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2. Express the ratios cosA, tanA and sec A in terms of sin A.

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3. Express $\cot 85^o + \cos 75^o$ in terms of trigonometric ratios of angles between 0^o and 45^o

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4. If $\sin 3A = \cos(A - 26^\circ)$, where 3A is an acute angle, find the value of A.

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5. 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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6. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{cosecA - 1}{cosecA + 1}$.

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

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8. Evaluate $\frac{\tan 65^\circ}{\cot 25^\circ}$.

A. 1

B. 2

C. 3

D. 4

Answer: A

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9. Given $\tan A = \frac{4}{3}$, find the other trigonometric ratios of the angle A.

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10. If $\angle B$ and $\angle Q$ are acute angles such that $\sin B = \sin Q$. Then prove that $\angle B = \angle Q$.

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11. Consider ΔACB , right-angled at C, in which $AB = 29$ units, $BC = 21$ units and $\angle ABC = \theta$. Determine the values of (i) $\cos 2\theta + \sin 2\theta$ (ii) $\cos 2\theta \sin 2\theta$

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12. In a right triangle ABC right-angled at B. if $tanA = 1$, then verify that $2 \sin A \cos A = 1$.

A. 0

B. 1

C. 2

D. 3

Answer: B

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13. In ΔOPQ, right-angled at P, $OP = 7\,cm$ and $OQ - PQ = 1\,cm$Determine the values of $\sin Q\ and\ \cos Q$.

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14. In ΔABC, right-angled at B, $AB = 5\,cm$ and $\angle ACB = 30^\circ$. Determine the lengths of the sides BC and AC.

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15. In PQR , right-angled at Q, $PQ = 3cm$ and $PR = 6cm$. Determine $\angle P$ and $\angle R$.

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Exercise 8 1

1. If $\cot\theta = \frac{7}{8}$, evaluate:

(i) $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

(ii) $\cot^2\theta$

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2. If $\angle A$ and $\angle B$ are acute angles such that $\cos A = \cos B$. then show that $\angle A = \angle B$.

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3. Given $\sec\theta = \frac{13}{12}$, calculate all other trigonometric ratios.

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4. Given $15\cot A = 8$, find sin A and sec A.

A. $\sin A = \frac{15}{17}, \sec A = \frac{17}{8}$

B. $\sin A = \frac{13}{17}, \sec A = \frac{11}{8}$

C. $\sin A = \frac{15}{17}, \sec A = \frac{19}{8}$

D. $\sin A = \frac{13}{17}, \sec A = \frac{17}{8}$

Answer: A

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5. If $\sin A = \frac{3}{4}$, calculate cos A and tan A.

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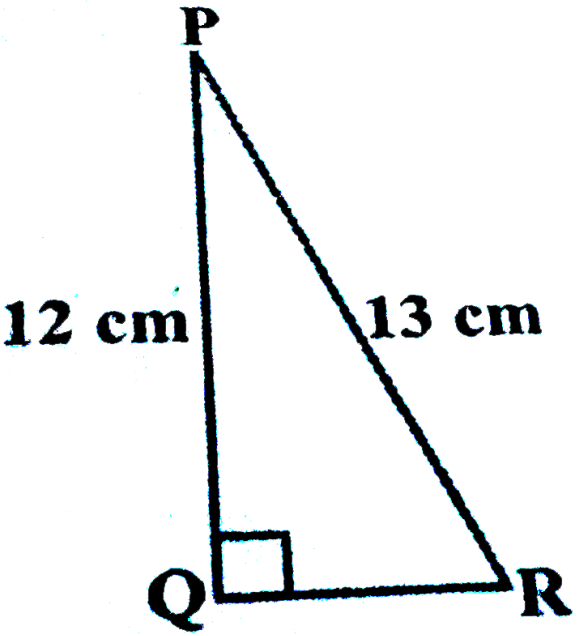
6. Find $\tan P - \cot R$.



A. 1

B. 2

C. 3

D. 0

Answer: D

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7. In ΔABC, right-angled at B, $AB = 24\,cm$, $BC = 7\,cm$. Determine:

(i) sin A, cos A

(ii) sin C, cos C

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8. In triangle ABC, right-angled at B. if $\tan A = \frac{1}{\sqrt{3}}$ 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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9. If $3\cot A = 4$, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ or not.

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10. In ΔPQR, right angled at Q, $PR + QR = 25cm$ and $PQ = 5cm$. Determine the values of $\sin P$, $\cos P$ and $\tan P$

.

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11. State whether the following are true or false. Justify your answer. (i) The value of tan A always less than 1. (ii) $\sec A = \frac{12}{5}$ for some value of angle A (iii) cos A is the

abbreviation used for the cosecant of angle A. (iv) cot A is the produ

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Exercise 8 3

1. If $sec4A = \cos ec(A20o)$, where 4A is an acute angle, find the value of A.

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2. If $tanA = \cot B$, prove that $A + B = 90^\circ$

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3. Express $\sin 67^\circ + \cos 75^\circ$ in terms of trigonometric ratios of angles between 0° and 45°.

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4. If A, B and C are interior angles of a triangle ABC, then show that $\sin\left(\frac{B+C}{2}\right) = \cos\left(\frac{A}{2}\right)$.

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5. Evaluate :

(i) $\frac{\sin 18^\circ}{\cos 72^\circ}$

(ii) $\frac{\tan 26^\circ}{\cot 64^\circ}$

(iii) $\cos 48^\circ - \sin 42^\circ$

(iv) $cosec 31^\circ \sec 59^\circ$

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6. If $\tan 2A = \cot\left(A - 18^0\right)$, where $2A$ is an acute angle, find the value of A.

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7. Show that :

(i) $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1$

(ii) $\cos 38^\circ \cos 52^\circ - \sin 38^\circ \sin 52^\circ = 0$

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