Foundation

UDAAN 2025

MATHS

Trigonometry

Do Again Very Important DHA

DHA: 03

Q 1 $\sec\theta$ can be expressed in terms of $\cot\theta$ as:

(A) $\frac{1+\cot^2\theta}{\cot\theta}$

(B) $\sqrt{1+\cot^2\theta}$

(C) $\frac{\sqrt{1+\cot^2\theta}}{\cot\theta}$

(D) $\frac{\sqrt{1-\cot^2\theta}}{\cot\theta}$

Q 2 Which of these is equivalent to $\frac{2\tan x\left(\sec^2 x-1\right)}{\cos^3 x}$?

(A) $2\tan^3 x\,\text{cosec}\,x$

(B) $2\cot^3 x\,\text{cosec}^3 x$

(C) $2\tan^3 x\sec^3 x$

(D) $2\cot^3 x\sec^3 x$

Q 3 $(1+\tan\theta+\sec\theta)(1+\cot\theta-\text{cosec}\,\theta)$ is equal to

(A) 0 (B) 2

(C) 1 (D) -1

Q 4

$$\sqrt{\frac{1+\sin q}{1-\sin q}}+\sqrt{\frac{1-\sin q}{1+\sin q}}=$$

(A) $\frac{2}{\sin q}$

(B) $\frac{2}{\cos q}$

(C) $\frac{2}{\tan q}$

(D) $\frac{2}{\cot q}$

Q 5 $\sec^4 A-\sec^2 A$ is equal to:

(A) $\tan^2 A-\tan^4 A$

(B) $\tan^4 A-\tan^2 A$

(C) $\tan^4 A+\tan^2 A$

(D) None of these

Q 6 $\frac{\sin\theta}{1+\cos\theta}$ is equal to:

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

(B) $\frac{1+\cos\theta}{\cos\theta}$

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

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

Q 7 Match the following

	Column-I		Column-II
(1)	$\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{cosA}$	(A)	Cosec A + cot A
(2)	$\frac{\cos A-\sin A+1}{\cos A+\sin A-1}$	(B)	$\frac{2}{\cos A}$
(3)	$\sqrt{\frac{1+\sin A}{1-\sin A}}$	(C)	sec A + tan A
(4)	$\frac{\sin^2 A}{1-\cos A}$	(D)	1 + cosA

(A) 1–A, 2–B, 3–C, 4–D

(B) 1–A, 2–B, 3–D, 4–C

(C) 1–B, 2–A, 3–C, 4–D

(D) 1–A, 2–D, 3–C, 4–D

Q 8 **Assertion (A):** $\left(\cos^2\theta-\sin^2\theta\right)=\frac{2\tan\theta}{1-\tan^2\theta}$ is not identity.

Reason (R): A equation involving trigonometric ratios of an angle is called a trigonometric identity, if it is true for all values of angles involved.

(A) (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(B) (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(C) (C) Assertion (A) is true but reason (R) is false.

(D) (d) Assertion (A) is false but reason (R) is true

Q 9 $\mathbf{Assertion(A):}\ \frac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}=\tan\theta$, where θ lis acute angle.

$\mathbf{Reason(R):}$ For acute angle A, $\tan A=\frac{\sin A}{\cos A}$ and $\sin^2 A+\cos^2 A=1$.

(A) (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(B) (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(C) (C) Assertion (A) is true but reason (R) is false.

(D) (d) Assertion (A) is false but reason (R) is true

Direction (10 - 11) Read the following passage and answer the given questions.

Passage-I: Equations like $\sin^2\theta+\cos^2\theta=1$ and $1+\tan^2\theta=\sec^2\theta$ which involves trigonometric ratio of an angle θ are called trigonometric identities.

Q10 (i) If $\sin\theta+\cos\theta=\sqrt{3}$, then $\frac{1}{\sec\theta\,\text{coses}\,\theta}=$

(A) 1 (B) 0

(C) $\frac{1}{2}$ (D) 3

Q11 If $1+\sin^2\theta=3\sin\theta\cos\theta$, then $\cot\theta=$

(A) 1 (B) 2

(C) –2 (D) 3

Answer Key

Q1	**C**
Q2	**C**
Q3	**B**
Q4	**B**
Q5	**C**
Q6	**C**
Q7	**C**
Q8	**A**
Q9	**A**
Q10	**A**
Q11	**A**

Hints & Solutions

Q 1 Text Solution:

$$\frac{\sqrt{1+\cot^2\theta}}{\cot\theta}$$

Video Solution:

Q 2 Text Solution:

$$2\tan^3 x \sec^3 x$$

Video Solution:

Q 3 Text Solution:

2

Video Solution:

Q 4 Text Solution:

$$\frac{2}{\cos q}$$

Video Solution:

Q 5 Text Solution:

$$\tan^4 A + \tan^2 A$$

Video Solution:

Q 6 Text Solution:

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

Video Solution:

Q 7 Video Solution:

Q 8 Text Solution:

We have, $\left(\cos^2\theta - \sin^2\theta\right) = \frac{2\tan\theta}{1-\tan^2\theta}$

Putting

$\theta = 30^\circ$, we get $\text{L.H.S} = \left(\cos^2 30^\circ - \sin^2 30^\circ\right)$

$\left\{\left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2\right\} = \left(\frac{3}{4} - \frac{1}{4}\right) = \frac{2}{4} = \frac{1}{2}$

$\text{R.}\,H.S = \frac{2\tan 30^\circ}{\left(1-\tan^2 30^\circ\right)} = \frac{2\times\frac{1}{\sqrt{3}}}{\left(1-\frac{1}{3}\right)} = \left(\frac{2}{\sqrt{3}} \times \frac{3}{2}\right) = \sqrt{3}$

$\therefore$ L. H.S $S \neq$ R.H.S

Hence the given equation is not an identity.

Assertion true: Reason: True and it is the correct explanation of Assertion.

Video Solution:

Q 9 Text Solution:

$\text{L. H.}\,S = \frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \frac{\sin\theta\left(1-2\sin^2\theta\right)}{\cos\theta\left(2\cos^2\theta-1\right)}$

$\tan\theta.\ \frac{\left[1-2\left(1-\cos^2\theta\right)\right]}{\left(2\cos^2\theta-1\right)}\ \left[\sin^2\theta = 1-\cos^2\theta\right]$

$\tan\theta \cdot \frac{\left(2\cos^2\theta-1\right)}{\left(2\cos^2\theta-1\right)} = \tan\theta = \text{R.}\,H\cdot S$

Assertion: True: Reason: True and it is the correct explanation of Assertion.

Video Solution:

Q10. Text Solution:

We have, $\sin\theta + \cos\theta = \sqrt{3}$

$\Rightarrow (\sin\theta + \cos\theta)^2 = \left(\sqrt{3}\right)^2$

$\Rightarrow \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 3$

$\Rightarrow 1 + 2\sin\theta\cos\theta = 3 \Rightarrow 2\sin\theta\cos\theta = 2$

$\Rightarrow \sin\theta\cos\theta = 1$

$\Rightarrow \frac{1}{\text{cosec}\,\theta\sec\theta} = 1$

Video Solution:

Q11. Text Solution:

We have, $1 + \sin^2\theta = 3\sin\theta\cos\theta$

Dividing both sides by $\cos^2\theta$, we obtain

$\frac{1+\sin^2\theta}{\cos^2\theta} = \frac{3\sin\theta\cos\theta}{\cos^2\theta}$

$\Rightarrow \frac{1}{\cos^2\theta} + \frac{\sin^2\theta}{\cos^2\theta} = \frac{3\sin\theta}{\cos\theta}$

$\Rightarrow \sec^2\theta + \tan^2\theta = 3\tan\theta$

$\Rightarrow 1 + \tan^2\theta + \tan^2\theta = 3\tan\theta$

$\left[\because \sec^2\theta = 1 + \tan^2\theta\right]$

$\Rightarrow 2\tan^2\theta - 3\tan\theta + 1 = 0$

$\Rightarrow 2\tan^2\theta - 2\tan\theta - \tan\theta + 1 = 0$
$\Rightarrow (2\tan\theta - 1)(\tan\theta - 1) = 0$
$\Rightarrow 2\tan\theta - 1 = 0 \text{ or } \tan\theta - 1 = 0$
$\Rightarrow \tan\theta = \frac{1}{2} \text{ or } \tan\theta = 1$
$\Rightarrow \cot\theta = 2 \text{ or } 1$

Video Solution: