Foundation

UDAAN 2025

MATHS

DHA: 04

Trigonometry

Q1 $\frac{1+\tan^2 A}{1+cot^2 A}$ *is equal to* :

(A) $sec^2 A$ (B) -1

(C) $cot^2 A$ (D) $\tan^2 A$

Q2 $\frac{\sin\theta}{1+\cos\theta}$ *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) $\frac{1-\sin\theta}{\cos\theta}$

Q3 $sec^4 A - sec^2 A$ *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

Q4 $\frac{\sin^4\theta - \cos^4\theta}{1-\sin^2\theta}$ *is equal to* :

(A) $1 - cot^2\theta$ (B) $1 - \tan^2\theta$

(C) $\tan^2\theta - 1$ (D) $cot^2\theta - 1$

Q5 $\cos^4 x - \sin^4 x$ *is equal to* :

(A) $2\sin^2 x - 1$ (B) $-1 + 2\cos^2 x$

(C) $\sin^2 x - \cos^2 x$ (D) 1

Q6 *If* $sec\ A = \frac{7}{6}$, *then find the value of* $cos^2 A + cot^2 A$?

(A) $\frac{637}{2232}$ (B) $\frac{36}{13}$

(C) $\frac{2232}{637}$ (D) $\frac{13}{36}$

Q7 *If* $\sin\theta = \frac{a}{b}$, *then* $\tan\theta = ?$

(A) $\frac{\sqrt{b^2-a^2}}{b}$ (B) $\frac{\sqrt{b^2-a^2}}{a}$

(C) $\frac{b}{\sqrt{b^2-a^2}}$ (D) $\frac{a}{\sqrt{b^2-a^2}}$

Q8 *The value of* $\frac{1}{1+\sin^2\theta} + \frac{1}{1+cos^2\theta} + \frac{1}{1+sec^2\theta} + \frac{1}{1+cosec^2\theta}$ *is*

(A) 0 (B) 1

(C) 2 (D) -1

Q9 $1 + \frac{cot^2\alpha}{1+\operatorname{cosec}\alpha} =$

(A) $\operatorname{cosec}\alpha$

(B) $\cos\ \alpha$

(C) $\sin\ \alpha$

(D) $\sec\alpha$

Q10 *If* $\cos\theta + sec\theta = \frac{5}{2}$, *then* $\cos^2\theta + sec^2\theta =$

(A) $\frac{21}{4}$ (B) $\frac{17}{4}$

(C) $\frac{29}{4}$ (D) $\frac{33}{4}$

Answer Key

Q1	(D)
Q2	(C)
Q3	(C)
Q4	(C)
Q5	(B)
Q6	(C)
Q7	(D)
Q8	(C)
Q9	(A)
Q10	(B)

Hints & Solutions

Q1 Text Solution:

$= \frac{1+\tan^2 A}{1+cot^2 A}$

$\left[\because 1+\tan^2 A = sec^2 A \; and \; 1+cot^2 A = \cos ec^2 A\right]$

$= \frac{sec^2 A}{\cos ec^2 A}$

$\left[\because \frac{1}{secA} = \cos A \; and \; \frac{1}{\cos ecA} = \sin A\right]$

$= \frac{\sin^2 A}{\cos^2 A}$

$= \tan^2 A$

Video Solution:

Q2 Text Solution:

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

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

$= \frac{\sin\theta \times (1-\cos\theta)}{1-\cos^2\theta}$

$= \frac{\sin\theta \times (1-\cos\theta)}{\sin^2\theta}$

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

Video Solution:

Q3 Text Solution:

$= sec^4 A - sec^2 A$

$= \left(sec^2 A\right)^2 - \left(1+\tan^2 A\right)$

$= \left(1+\tan^2 A\right)^2 - \left(1+\tan^2 A\right)$

$= 1+\tan^4 A + 2\tan^2 A - 1 - \tan^2 A$

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

Video Solution:

Q4 Text Solution:

$= \frac{\sin^4\theta - \cos^4\theta}{1-\sin^2\theta}$

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

$= \frac{\left(\sin^2\theta - \cos^2\theta\right)\left(\sin^2\theta + \cos^2\theta\right)}{1-\sin^2\theta}$

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

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

$= \tan^2\theta - 1$

Video Solution:

Q5 Text Solution:

$= \cos^4 x - \sin^4 x$

$= \left(\cos^2 x - \sin^2 x\right)\left(\cos^2 x + \sin^2 x\right)$

$= \left(\cos^2 x - \sin^2 x\right)$

$= \left(\cos^2 x - 1 + \cos^2 x\right)$

$= 2\cos^2 x - 1$

Video Solution:

Q6 Text Solution:

$Given\ sec\ A = \frac{7}{6}$

$cos\ A\ = \frac{6}{7}$

$\Rightarrow cos^2 A = \left(\frac{6}{7}\right)^2 = \frac{36}{49}$

$u\sin g,\ s\text{in}^2\ A + cos^2 A = 1,\ we\ get$

$\Rightarrow sin^2 A = 1 - cos^2 A$

$\Rightarrow sin^2 A = 1 - \left(\frac{6}{7}\right)^2 = 1 - \frac{36}{49} = \frac{49-36}{49}$

$= \frac{13}{49}$

$cot^2 A = \frac{cos^2 A}{sin^2 A} = \frac{\frac{36}{49}}{\frac{13}{49}} = \frac{36}{13}$

$cos^2 A + cot^2 A = \frac{36}{49} + \frac{36}{13} = \frac{36(13+49)}{49\times13}$

$= \frac{36\times62}{637} = \frac{2232}{637}$

Video Solution:

Q7 Text Solution:

$Given\ \sin\ \theta = \frac{a}{b}$

$U\sin g\ \sin^2\theta + \cos^2\theta = 1$

$\Rightarrow cos^2\theta = 1 - \sin^2\theta$

$\Rightarrow cos^2\theta = 1 - \left(\frac{a}{b}\right)^2$

$\Rightarrow cos^2\theta = 1 - \frac{a^2}{b^2} = \frac{b^2-a^2}{b^2}$

$\Rightarrow cos\theta = \sqrt{\frac{b^2-a^2}{b^2}} = \frac{\sqrt{b^2-a^2}}{b}$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{a}{b}}{\frac{\sqrt{b^2-a^2}}{b}} = \frac{a}{\sqrt{b^2-a^2}}$

Video Solution:

Q8 Text Solution:

$Given\ :$

$\frac{1}{1+\sin^2\theta} + \frac{1}{1+cos^2\theta} + \frac{1}{1+sec^2\theta} + \frac{1}{1+cosec^2\theta}$

$Rearranging\ the\ order\ as$

$\Rightarrow \frac{1}{1+\sin^2\theta} + \frac{1}{1+cosec^2\theta} + \frac{1}{1+cos^2\theta} + \frac{1}{1+sec^2\theta}$

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

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

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

$\Rightarrow 1 + 1$

$= 2$

Video Solution:

Q9 Text Solution:

$1 + \frac{cot^2\alpha}{1+\cos ec\ \alpha}$

$\Rightarrow 1 + \frac{\cos ec^2\ \alpha - 1}{1+\cos ec\ \alpha}$

$\left[U\sin g\ \cos ec^2\alpha - cot^2\alpha = 1\right]$

$\Rightarrow 1 + \frac{(\cos ec\ \alpha+1)(\cos ec\ \alpha-1)}{1+\cos ec\ \alpha}$

$\Rightarrow 1 + \cos ec\ \alpha - 1$

$= \cos ec\ \alpha$

Video Solution:

Q10 Text Solution:

$Given\ :$

$\cos\theta + sec\theta = \frac{5}{2}$

$Squaring\ on\ both\ sides,\ we\ get$

$(\cos\theta + sec\theta)^2 = \left(\frac{5}{2}\right)^2 \Rightarrow cos^2\theta + sec^2\theta$

$+ 2\cos\theta sec\theta = \frac{25}{4}$

$\Rightarrow cos^2\theta + sec^2\theta + 2\cos\theta.\ \frac{1}{\cos\theta} = \frac{25}{4}$

$\Rightarrow cos^2\theta + sec^2\theta = \frac{25}{4} - 2$

$\Rightarrow cos^2\theta + sec^2\theta = \frac{25-8}{4} = \frac{17}{4}$

Video Solution: