

CDS-AFCAT 2 2024

SSBCrack
EXAMS

LIVE

MATHS

TRIGONOMETRY

CLASS 3



NAVJYOTI SIR



13 June 2024 Live Classes Schedule

8:00AM --- 13 JUNE 2024 DAILY CURRENT AFFAIRS --- RUBY MA'AM

SSB INTERVIEW LIVE CLASSES

9:00AM --- OVERVIEW OF GTO --- ANURADHA MA'AM

AFCAT 2 2024 LIVE CLASSES

4:00PM --- MATHS - TRIGONOMETRY - CLASS 3 --- NAVJYOTI SIR ✓

5:30PM --- ENGLISH - CLOZE TEST - CLASS 2 --- ANURADHA MA'AM ✓

NDA 2 2024 LIVE CLASSES

11:30AM --- GK - INDIAN GEOGRAPHY - CLASS 2 --- RUBY MA'AM ✓

2:30PM --- GS - CHEMISTRY - CLASS 4 --- SHIVANGI MA'AM ✓

5:30PM --- ENGLISH - CLOZE TEST - CLASS 2 --- ANURADHA MA'AM ✓

6:30PM --- MATHS - SEQUENCE & SERIES - CLASS 2 --- NAVJYOTI SIR ✓

CDS 2 2024 LIVE CLASSES

11:30AM --- GK - INDIAN GEOGRAPHY - CLASS 2 --- RUBY MA'AM ✓

2:30PM --- GS - CHEMISTRY - CLASS 4 --- SHIVANGI MA'AM ✓

4:00PM --- MATHS - TRIGONOMETRY - CLASS 3 --- NAVJYOTI SIR ✓

5:30PM --- ENGLISH - CLOZE TEST - CLASS 2 --- ANURADHA MA'AM ✓



Q) If $\theta + \phi = \frac{\pi}{6}$, what is the value of $(\sqrt{3} + \tan \theta)$

$(\sqrt{3} + \tan \phi)$?

- (a) 1 (b) -1 (c) 4 (d) -4

$$3 + \sqrt{3}(\tan \theta + \tan \phi) + \tan \theta \tan \phi$$

$$3 + (1 - \tan \theta \tan \phi) + \tan \theta \tan \phi$$

$$= 4$$

$$\theta + \phi = \frac{\pi}{6}$$

$$\tan(\theta + \phi) = \tan \frac{\pi}{6}$$

$$\frac{\tan \theta + \tan \phi}{1 - \tan \theta \tan \phi} = \frac{1}{\sqrt{3}}$$

$$\sqrt{3}(\tan \theta + \tan \phi) = 1 - \tan \theta \tan \phi$$

Q) If $\theta + \phi = \frac{\pi}{6}$, what is the value of $(\sqrt{3} + \tan \theta)$

$(\sqrt{3} + \tan \phi)$?

- (a) 1 (b) -1 (c) 4 (d) -4

Ans: (c)

Q) If $\sec \theta + \tan \theta = x$, then $\sec \theta = ?$

(a) $\frac{x^2 + 1}{x}$ (b) $\frac{x^2 + 1}{2x}$ (c) $\frac{x^2 - 1}{2x}$ (d) $\frac{x^2 - 1}{x}$

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

$$(\sec \theta + \tan \theta)(\sec \theta - \tan \theta) = 1$$

$$x(\sec \theta - \tan \theta) = 1$$

$$\sec \theta - \tan \theta = \frac{1}{x} \quad \text{--- (1)}$$

Given $\sec \theta + \tan \theta = x$ --- (2)

$$\text{(1)} + \text{(2)}$$

$$2 \sec \theta = \frac{1}{x} + x$$

$$\sec \theta = \frac{1}{2} \left(\frac{x^2 + 1}{x} \right) = \frac{x^2 + 1}{2x}$$

Q) If $\sec \theta + \tan \theta = x$, then $\sec \theta = ?$

(a) $\frac{x^2 + 1}{x}$ (b) $\frac{x^2 + 1}{2x}$ (c) $\frac{x^2 - 1}{2x}$ (d) $\frac{x^2 - 1}{x}$

Ans: (b)

Q) If $\cos^4 \theta - \sin^4 \theta = \frac{2}{3}$, then the value of $2 \cos^2 \theta - 1$ is

- (a) 0 (b) 1 (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

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

$$1 (2 \cos^2 \theta - 1) = \frac{2}{3}$$

\equiv

$$\left. \begin{array}{l} \cos^2 \theta - \sin^2 \theta \\ 2 \cos^2 \theta - 1 \\ 1 - 2 \sin^2 \theta \\ \frac{1 + \tan^2 \theta}{1 - \tan^2 \theta} \end{array} \right\} \text{Cos } 2\theta$$

Q) If $\cos^4 \theta - \sin^4 \theta = \frac{2}{3}$, then the value of $2 \cos^2 \theta - 1$ is

- (a) 0 (b) 1 (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

Ans: (c)

Q) If $\csc 39^\circ = x$, the value of

$$\frac{1}{\csc^2 51^\circ} + \sin^2 39^\circ + \tan^2 51^\circ$$

$$- \frac{1}{\sin^2 51^\circ \sec^2 39^\circ} \text{ is}$$

$$\csc^2(90^\circ - 39^\circ) \quad \sin^2 51^\circ + \cos^2(90^\circ - 39^\circ)$$

$$\csc^2(90^\circ - 51^\circ) \quad \sin \longleftrightarrow \cos$$

$$\csc \longleftrightarrow \sec$$

$$\sin^2 51^\circ + \cos^2 51^\circ + \sec^2 51^\circ - 1 -$$

$$\frac{1}{\sin^2 51^\circ \csc^2 51^\circ}$$

$$\frac{1}{1} + \csc^2 39^\circ - \frac{1}{1} - \frac{1}{1}$$

$$= 1 - 2 + x^2$$

$$= -1 + x^2 = x^2 - 1$$

$$\sec 51^\circ = \csc(90^\circ - 51^\circ)$$

$$\sec^2 51^\circ = \csc^2 39^\circ$$

Q) If $\operatorname{cosec} 39^\circ = x$, the value of $\frac{1}{\operatorname{cosec}^2 51^\circ} + \sin^2 39^\circ + \tan^2 51^\circ$

$-\frac{1}{\sin^2 51^\circ \sec^2 39^\circ}$ is

Ans: (c)

Q) If $\sin^2\alpha = \cos^3\alpha$, then the value of $(\cot^6\alpha - \cot^2\alpha)$ is

- (a) 1 (b) 0 (c) -1 (d) 2

$$1 = \frac{\cos^2\alpha}{\sin^2\alpha} \cdot \cos\alpha$$

$$\sec\alpha = \cot^2\alpha$$

$$\cot^2\alpha ((\cot^2\alpha)^2 - 1)$$

$$\sec\alpha (\sec^2\alpha - 1)$$

$$\sec\alpha (\tan^2\alpha)$$

$$\frac{1}{\cos\alpha} \times \frac{\sin^2\alpha}{\cos^2\alpha} = \frac{\sin^2\alpha}{\cos^3\alpha} = 1$$

Q) If $\sin^2\alpha = \cos^3\alpha$, then the value of $(\cot^6\alpha - \cot^2\alpha)$ is

- (a) 1 (b) 0 (c) -1 (d) 2

Ans: (a)

Q) If $p = \cot \theta + \tan \theta$ and $q = \sec \theta - \cos \theta$, then

$(p^2 q)^{2/3} - (q^2 p)^{2/3}$ is equal to

- (a) 0 ~~(b) 1~~
 (c) 2 (d) 3

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

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

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

$$(p^2 q)^{2/3} = \left(\frac{1}{\sin^2 \theta \cos^2 \theta} \times \frac{\sin^2 \theta}{\cos \theta} \right)^{2/3} = \frac{1}{\cos^2 \theta} = \sec^2 \theta$$

$$(q^2 p)^{2/3} = \left(\frac{\sin^4 \theta}{\cos^2 \theta} \times \frac{1}{\sin \theta \cos \theta} \right)^{2/3} = \left(\frac{\sin^3 \theta}{\cos^3 \theta} \right)^{2/3} = \frac{\sin^2 \theta}{\cos^2 \theta}$$

$$(p^2 q)^{2/3} - (q^2 p)^{2/3} = \frac{1 - \sin^2 \theta}{\cos^2 \theta} = \underline{1}$$

Q) If $p = \cot \theta + \tan \theta$ and $q = \sec \theta - \cos \theta$, then

$(p^2 - q)^{\frac{2}{3}} - (q^2 - p)^{\frac{2}{3}}$ is equal to

(a) 0

(b) 1

(c) 2

(d) 3

Ans: (b)

Q) If $\frac{\cos x}{1 + \operatorname{cosec} x} + \frac{\cos x}{\operatorname{cosec} x - 1} = 2$, then which one of the

following is one of the values of x?

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{3}$

(c) $\frac{\pi}{4}$

(d) $\frac{\pi}{6}$

check with options,

(a) $0 + 0 = 0$

(b) $\frac{\frac{1}{2}}{1 + \frac{2}{\sqrt{3}}} + \frac{\frac{1}{2}}{\frac{2}{\sqrt{3}} - 1} = \frac{\sqrt{3}}{2(\sqrt{3} + 2)} + \frac{\sqrt{3}}{2(2 - \sqrt{3})}$

$$\begin{aligned} & \cos x \left(\frac{1}{1 + \operatorname{cosec} x} - \frac{1}{1 - \operatorname{cosec} x} \right) \\ &= \cos x \left(\frac{-2 \operatorname{cosec} x}{1 - \operatorname{cosec}^2 x} \right) = \frac{-2 \cot x}{1 - \operatorname{cosec}^2 x} \end{aligned}$$

(c) $\frac{\frac{1}{\sqrt{2}}}{1 + \sqrt{2}} + \frac{\frac{1}{\sqrt{2}}}{\sqrt{2} - 1} = \frac{1}{\sqrt{2}(1 + \sqrt{2})} + \frac{1}{\sqrt{2}(\sqrt{2} - 1)}$

$$= \frac{1}{\sqrt{2} + 2} - \frac{1}{\sqrt{2} - 2}$$

$$= \frac{-4}{2 - 4} = \frac{-4}{-2} = 2 \checkmark$$

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

$$\frac{-2 \cot x}{1 - \operatorname{cosec}^2 x} = \frac{2 \cot x}{\operatorname{cosec}^2 x - 1} = \frac{2 \cot x}{\cot^2 x} = \frac{2}{\cot x} = 2$$

$$\cot x = 1$$

$$x = \pi/4$$

Q) If $\frac{\cos x}{1 + \operatorname{cosec} x} + \frac{\cos x}{\operatorname{cosec} x - 1} = 2$, then which one of the

following is one of the values of x ?

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{3}$

(c) $\frac{\pi}{4}$

(d) $\frac{\pi}{6}$

Ans: (c)

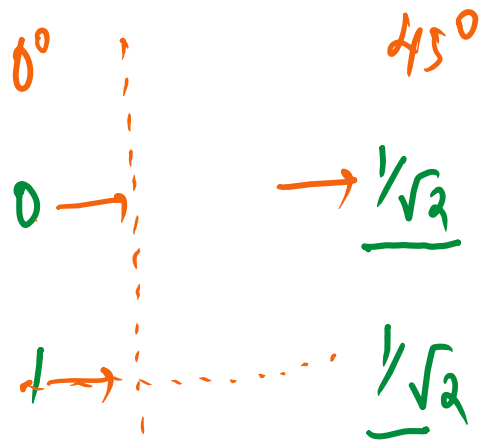
Q) Consider the following statements :

1. $\sin 66^\circ$ is less than $\cos 66^\circ$ \checkmark
2. $\sin 26^\circ$ is less than $\cos 26^\circ$ \checkmark

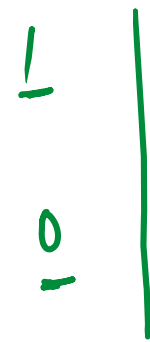
$\theta \rightarrow 0^\circ \text{ to } 45^\circ \mid \sin \theta < \cos \theta$
 $\theta \rightarrow 45^\circ \text{ to } 90^\circ \mid \sin \theta > \cos \theta$

Which of the above statements is/are correct ?

- (a) 1 only ~~(b) 2 only~~
 (c) Both 1 and 2 (d) Neither 1 nor 2



90°



$\sin x$ - increasing } for θ from 0° to 90°
 $\cos x$ - decreasing }

Q) Consider the following statements :

1. $\sin 66^\circ$ is less than $\cos 66^\circ$
2. $\sin 26^\circ$ is less than $\cos 26^\circ$

Which of the above statements is/are correct ?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (b)

Q) If $\sin \theta + \cos \theta = a$ and $\frac{\sin \theta + \cos \theta}{\sin \theta \cos \theta} = b$, then

(a) $b = \frac{2a}{a^2 - 1}$

(b) $a = \frac{2b}{b^2 - 1}$

(c) $ab = b^2 - 1$

(d) $a + b = 1$

$$1 + 2 \sin \theta \cos \theta = a^2$$

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

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

Q) If $\sin \theta + \cos \theta = a$ and $\frac{\sin \theta + \cos \theta}{\sin \theta \cos \theta} = b$, then

(a) $b = \frac{2a}{a^2 - 1}$

(b) $a = \frac{2b}{b^2 - 1}$

(c) $ab = b^2 - 1$

(d) $a + b = 1$

Ans: (a)

Q) If $x = p \sec \theta$ and $y = q \tan \theta$ then

(a) $x^2 - y^2 = p^2 q^2$ (b) $x^2 q^2 - y^2 p^2 = pq$

(c) $x^2 q^2 - y^2 p^2 = \frac{1}{p^2 q^2}$ (d) $x^2 q^2 - y^2 p^2 = p^2 q^2$

Q) If $x = p \sec \theta$ and $y = q \tan \theta$ then

(a) $x^2 - y^2 = p^2 q^2$ (b) $x^2 q^2 - y^2 p^2 = pq$

(c) $x^2 q^2 - y^2 p^2 = \frac{1}{p^2 q^2}$ (d) $x^2 q^2 - y^2 p^2 = p^2 q^2$

Ans: (d)

Q) If $\sin \alpha + \cos \beta = 2$ ($0^\circ \leq \beta < \alpha \leq 90^\circ$), then $\sin \left(\frac{2\alpha + \beta}{3} \right) =$

(a) $\sin \frac{\alpha}{2}$

~~(b) $\cos \frac{\alpha}{3}$~~

(c) $\sin \frac{\alpha}{3}$

(d) $\cos \frac{2\alpha}{3}$

$$\begin{aligned} \sin \left(\frac{2 \times 90^\circ + 0^\circ}{3} \right) &= \sin \left(\frac{180^\circ}{3} \right) \\ &= \sin 60^\circ = \frac{\sqrt{3}}{2} \end{aligned}$$

$$\left. \begin{aligned} \sin \alpha + \sin (90^\circ - \beta) &= 2 \\ \sin 90^\circ + \sin (90^\circ - 0) &= 2 \end{aligned} \right\} \begin{aligned} \alpha &= 90^\circ \\ \beta &= 0^\circ \end{aligned}$$

(Max. value of $\sin \theta = 1$
 $\cos \theta = 1$)

if $\sin \alpha + \cos \beta = 2$
 $\Rightarrow \sin \alpha = 1 \Rightarrow \alpha = 90^\circ$ (for α, β b/w 0° to 90°)
 $\Rightarrow \cos \beta = 1 \Rightarrow \beta = 0^\circ$

Q) If $\sin \alpha + \cos \beta = 2$ ($0^\circ \leq \beta < \alpha \leq 90^\circ$), then $\sin \left(\frac{2\alpha + \beta}{3} \right) =$

(a) $\sin \frac{\alpha}{2}$

(b) $\cos \frac{\alpha}{3}$

(c) $\sin \frac{\alpha}{3}$

(d) $\cos \frac{2\alpha}{3}$

Ans: (b)

Q) If $\sec x \operatorname{cosec} x = 2$, then what is $\tan^n x + \cot^n x$ equal to?

(a) 2

(b) 2^{n+1}

(c) $2n$

(d) 2^{n-1}

$$\frac{1}{\cos x \sin x} = 2$$

$$1 = \underline{2 \sin x \cos x}$$

$$1 = \underline{\sin 2x}$$

$$\Rightarrow \underline{2x = 90^\circ} \Rightarrow \underline{x = 45^\circ}$$

$$\begin{aligned} \tan^n 45^\circ + \cot^n 45^\circ \\ = 1^n + 1^n = 1 + 1 = \textcircled{2} \end{aligned}$$

Q) If $\sec x \operatorname{cosec} x = 2$, then what is $\tan^n x + \cot^n x$ equal to?

(a) 2

(b) 2^{n+1}

(c) $2n$

(d) 2^{n-1}

Ans: (a)

Q) What is $\frac{\cos^4 A - \sin^4 A}{\cos^2 A - \sin^2 A}$ equal to ?

(a) $\cos^2 A - \sin^2 A$

(b) $\cos A - \sin A$

(c) 1

(d) 2

Q) What is $\frac{\cos^4 A - \sin^4 A}{\cos^2 A - \sin^2 A}$ equal to ?

- (a) $\cos^2 A - \sin^2 A$ (b) $\cos A - \sin A$
(c) 1 (d) 2

Ans: (c)

Q) If $7 \sin^2 x + 3 \cos^2 x = 4$, $0 < x < 90^\circ$, then what is the value of $\tan x$?

(a) $\sqrt{2}$

(b) 1

(c) $\frac{\sqrt{3}}{2}$

(d) $\frac{1}{\sqrt{3}}$

$$7 \sin^2 x + 3 - 3 \sin^2 x = 4$$

$$4 \sin^2 x = 1$$

$$\sin^2 x = \frac{1}{4}$$

$$\sin x = \frac{1}{2} \text{ (for } 0 < x < 90^\circ \Rightarrow \sin x \text{ is positive)}$$

$$x = 30^\circ$$

$$\tan x = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

Q) If $7 \sin^2 x + 3 \cos^2 x = 4$, $0 < x < 90^\circ$, then what is the value of $\tan x$?

(a) $\sqrt{2}$

(b) 1

(c) $\frac{\sqrt{3}}{2}$

(d) $\frac{1}{\sqrt{3}}$

Ans: (d)

Q) If $\sin x + \sin^2 x = 1$, then what is the value of $\cos^8 x + 2\cos^6 x + \cos^4 x$?

(a) 0

(b) 1

(c) 2

(d) 4

Given,

$$\sin x = \cos^2 x$$

$$(\cos^4 x + \cos^2 x)^2$$

$$(\sin^2 x + \sin x)^2$$

$$= 1^2 = 1$$

Q) If $\sin x + \sin^2 x = 1$, then what is the value of $\cos^8 x + 2\cos^6 x + \cos^4 x$?

(a) 0

(b) 1

(c) 2

(d) 4

Ans: (b)

Q) What is the value of $\operatorname{cosec}^2 68^\circ + \sec^2 56^\circ - \cot^2 34^\circ - \tan^2 22^\circ$?

(a) 0

(b) $\frac{1}{2}$

(c) 1

(d) 2

Ans: (d)

Q) If $\tan \theta + \cot \theta = \frac{4}{\sqrt{3}}$, where $0 < \theta < \frac{\pi}{2}$, then $\sin \theta + \cos \theta$ is

equal to

$\sin 30^\circ + \cos 30^\circ$

(a) 1

(b) $\frac{\sqrt{3}-1}{2}$

(c) $\frac{\sqrt{3}+1}{2}$

(d) $\sqrt{2}$

$$\frac{1}{\sin \theta \cos \theta} = \frac{4}{\sqrt{3}}$$

$$\sin \theta \cos \theta = \frac{\sqrt{3}}{4}$$

$$\frac{2 \sin \theta \cos \theta}{2} = \frac{\sqrt{3}}{4}$$

$$\sin 2\theta = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$$

$$\sin 2\theta = \frac{\sqrt{3}}{2} \Rightarrow 2\theta = 60^\circ \Rightarrow \theta = \underline{30^\circ}$$

Q) If $\tan \theta + \cot \theta = \frac{4}{\sqrt{3}}$, where $0 < \theta < \frac{\pi}{2}$, then $\sin \theta + \cos \theta$ is equal to

(a) 1

(b) $\frac{\sqrt{3}-1}{2}$

(c) $\frac{\sqrt{3}+1}{2}$

(d) $\sqrt{2}$

Ans: (c)

Q) What is $\sin^4\theta - \cos^4\theta$ equal to for any real number θ ?

(a) 1

(b) $1 - 2 \sin^2\theta$

(c) $2 \cos^2\theta + 1$

(d) $1 - 2 \cos^2\theta$

Q) What is $\sin^4\theta - \cos^4\theta$ equal to for any real number θ ?

(a) 1

(b) $1 - 2 \sin^2\theta$

(c) $2 \cos^2\theta + 1$

(d) $1 - 2 \cos^2\theta$

Ans: (d)

Q) If $\tan^2 x + \frac{1}{\tan^2 x} = 2$ and $0^\circ < x < 90^\circ$, then what is the value of x ?

- (a) 15° (b) 30°
 (c) 45° (d) 60°

$$\tan x = 1$$

$$\underline{x = 45^\circ}$$

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

$$\left(\tan x + \frac{1}{\tan x} \right)^2 = 4$$

$$\underline{\tan x} + \frac{1}{\underline{\tan x}} = 2 \quad \left(\text{For } 0^\circ < x < 90^\circ, \tan x > 0 \text{ (+ve)} \right)$$

Q) If $\tan^2 x + \frac{1}{\tan^2 x} = 2$ and $0^\circ < x < 90^\circ$, then what is the value of x ?

(a) 15°

(b) 30°

(c) 45°

(d) 60°

Ans: (c)

Q) If $p = \sqrt{\frac{1 - \sin x}{1 + \sin x}}$, $q = \frac{1 - \sin x}{\cos x}$, $r = \frac{\cos x}{1 + \sin x}$

then which of the following is/are correct ?

1. $p = q = r$
2. $p^2 = qr$ ✓

Select the correct answer using the code given below.

- | | |
|--|---------------------|
| (a) 1 only | (b) 2 only |
| <input checked="" type="checkbox"/> (c) Both 1 and 2 | (d) Neither 1 nor 2 |

$$p = \frac{1 - \sin x}{\cos x} = q = \frac{\cos x (1 - \sin x)}{1 - \sin^2 x} = \frac{\cancel{\cos x} (1 - \sin x)}{\cos^2 x}$$

Q) If $p = \sqrt{\frac{1 - \sin x}{1 + \sin x}}$, $q = \frac{1 - \sin x}{\cos x}$, $r = \frac{\cos x}{1 + \sin x}$

then which of the following is/are correct ?

1. $p = q = r$
2. $p^2 = qr$

Select the correct answer using the code given below.

- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

Ans: (c)

Q) If $\sin x + \cos x = p$ and $\sin^3 x + \cos^3 x = q$, then what is $p^3 - 3p$ equal to ?

(a) 0

(b) $-2q$

(c) $2q$

(d) $4q$

Q) If $\sin x + \cos x = p$ and $\sin^3 x + \cos^3 x = q$, then what is $p^3 - 3p$ equal to ?

(a) 0

(b) $-2q$

(c) $2q$

(d) $4q$

Ans: (b)

Q) What is $(\operatorname{cosec} x - \sin x) (\sec x - \cos x) (\tan x + \cot x)$ equal to ?

(a) $\sin x + \cos x$

(b) $\sin x - \cos x$

(c) 2

(d) 1

Q) What is $(\operatorname{cosec} x - \sin x) (\sec x - \cos x) (\tan x + \cot x)$ equal to ?

(a) $\sin x + \cos x$

(b) $\sin x - \cos x$

(c) 2

(d) 1

Ans: (d)

Q) If $\sec \theta + \tan \theta = 2$, then what is the value of $\sec \theta$?

(a) $\frac{3}{2}$

(b) $\sqrt{2}$

(c) $\frac{5}{2}$

(d) $\frac{5}{4}$

Q) If $\sec \theta + \tan \theta = 2$, then what is the value of $\sec \theta$?

(a) $\frac{3}{2}$

(b) $\sqrt{2}$

(c) $\frac{5}{2}$

(d) $\frac{5}{4}$

Ans: (d)

Q) What is $\frac{(\sin \theta + \cos \theta)(\tan \theta + \cot \theta)}{\sec \theta + \operatorname{cosec} \theta}$ equal to?

(a) 1

(b) 2

(c) $\sin \theta$

(d) $\cos \theta$

Q) What is $\frac{(\sin \theta + \cos \theta)(\tan \theta + \cot \theta)}{\sec \theta + \operatorname{cosec} \theta}$ equal to?

(a) 1

(b) 2

(c) $\sin \theta$

(d) $\cos \theta$

Ans: (a)

Q) If $a^2 = \frac{1 + 2 \sin \theta \cos \theta}{1 - 2 \sin \theta \cos \theta}$, then what is the value of

$$\frac{a+1}{a-1}?$$

- (a) $\sec \theta$
(c) 0

- (b) 1
(d) $\tan \theta$

Q) If $a^2 = \frac{1 + 2 \sin \theta \cos \theta}{1 - 2 \sin \theta \cos \theta}$, then what is the value of

$$\frac{a+1}{a-1}?$$

- (a) $\sec \theta$
(c) 0

- (b) 1
(d) $\tan \theta$

Ans: (d)

Q) If $3 \sin x + 5 \cos x = 5$, then what is the value of $(3 \cos x - 5 \sin x)$?

(a) 0

(b) 2

(c) 3

(d) 5

Q) If $3 \sin x + 5 \cos x = 5$, then what is the value of $(3 \cos x - 5 \sin x)$?

(a) 0

(b) 2

(c) 3

(d) 5

Ans: (c)

Q) The value of

$$\frac{\cot 5^\circ \cdot \cot 10^\circ \cdot \cot 15^\circ \cdot \cot 60^\circ \cdot \cot 75^\circ \cdot \cot 80^\circ \cdot \cot 85^\circ}{(\cos^2 20^\circ + \cos^2 70^\circ) + 2} \text{ is}$$

- (a) $\frac{9}{\sqrt{3}}$ (b) $\frac{1}{9}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{9}$

Q) The value of

$$\frac{\cot 5^\circ \cdot \cot 10^\circ \cdot \cot 15^\circ \cdot \cot 60^\circ \cdot \cot 75^\circ \cdot \cot 80^\circ \cdot \cot 85^\circ}{(\cos^2 20^\circ + \cos^2 70^\circ) + 2} \text{ is}$$

- (a) $\frac{9}{\sqrt{3}}$ (b) $\frac{1}{9}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{9}$

Ans: (d)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $\sin 17^\circ = \frac{x}{y}$, then $\sec 17^\circ - \sin 73^\circ$ is equal to

(a) $\frac{y}{\sqrt{y^2 - x^2}}$

(b) $\frac{y^2}{\left(x\sqrt{y^2 - x^2}\right)}$

(c) $\frac{x}{\left(y\sqrt{y^2 - x^2}\right)}$

(d) $\frac{x^2}{\left(y\sqrt{y^2 - x^2}\right)}$

Q) If $\sin 17^\circ = \frac{x}{y}$, then $\sec 17^\circ - \sin 73^\circ$ is equal to

(a) $\frac{y}{\sqrt{y^2 - x^2}}$

(b) $\frac{y^2}{\left(x\sqrt{y^2 - x^2}\right)}$

(c) $\frac{x}{\left(y\sqrt{y^2 - x^2}\right)}$

(d) $\frac{x^2}{\left(y\sqrt{y^2 - x^2}\right)}$

Ans: (d)

Q) If $0^\circ < \theta < 90^\circ$, then all the trigonometric ratios can be obtained when

- (a) only $\sin \theta$ is given
- (b) only $\cos \theta$ is given
- (c) only $\tan \theta$ is given
- (d) any one of the six ratios is given

Q) If $0^\circ < \theta < 90^\circ$, then all the trigonometric ratios can be obtained when

- (a) only $\sin \theta$ is given
- (b) only $\cos \theta$ is given
- (c) only $\tan \theta$ is given
- (d) any one of the six ratios is given

Ans: (d)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $\frac{3 - \tan^2 A}{1 - 3 \tan^2 A} = K$

where K is a real number, then $\operatorname{cosec} A(3 \sin A - 4 \sin^3 A)$ is equal to

(a) $\frac{2K}{K-1}$

(b) $\frac{2K}{K-1}$, where $\frac{1}{3} \leq K \leq 3$

(c) $\frac{2K}{K-1}$, where $K < \frac{1}{3}$ or $K > 3$

(d) $\frac{2K}{K+1}$

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $\frac{3 - \tan^2 A}{1 - 3 \tan^2 A} = K$

where K is a real number, then $\operatorname{cosec} A(3 \sin A - 4 \sin^3 A)$ is equal to

(a) $\frac{2K}{K-1}$

(b) $\frac{2K}{K-1}$, where $\frac{1}{3} \leq K \leq 3$

(c) $\frac{2K}{K-1}$, where $K < \frac{1}{3}$ or $K > 3$

(d) $\frac{2K}{K+1}$

Ans: (c)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $\tan \theta = \frac{2}{3}$, then $\frac{3\sin \theta - 4\cos \theta}{3\sin \theta + 4\cos \theta}$ is equal to:

- (a) $-\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $-\frac{2}{3}$ (d) $\frac{1}{3}$

Q) If $\tan \theta = \frac{2}{3}$, then $\frac{3 \sin \theta - 4 \cos \theta}{3 \sin \theta + 4 \cos \theta}$ is equal to:

- (a) $-\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $-\frac{2}{3}$ (d) $\frac{1}{3}$

Ans: (a)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $\sin \theta = \sqrt{3} \cos \theta$, $0^\circ < \theta < 90^\circ$, then the value of $2 \sin^2 \theta + \sec^2 \theta + \sin \theta \sec \theta + \operatorname{cosec} \theta$ is:

(a) $\frac{33+10\sqrt{3}}{6}$

(b) $\frac{19+10\sqrt{3}}{6}$

(c) $\frac{33+10\sqrt{3}}{3}$

(d) $\frac{19+10\sqrt{3}}{3}$

Q) If $\sin \theta = \sqrt{3} \cos \theta$, $0^\circ < \theta < 90^\circ$, then the value of $2 \sin^2 \theta + \sec^2 \theta + \sin \theta \sec \theta + \operatorname{cosec} \theta$ is:

(a) $\frac{33+10\sqrt{3}}{6}$

(b) $\frac{19+10\sqrt{3}}{6}$

(c) $\frac{33+10\sqrt{3}}{3}$

(d) $\frac{19+10\sqrt{3}}{3}$

Ans: (a)

Q) What is the value of

$$\frac{\left\{ \left[4 \cos(90 - A) \sin^3(90 + A) \right] - \left[4 \sin(90 + A) \cos^3(90 - A) \right] \right\}}{\cos\left(\frac{180 + 8A}{2}\right)}?$$

- (a) 1 (b) -1 (c) 0 (d) 2

Q) What is the value of

$$\frac{\left\{ \left[4 \cos(90 - A) \sin^3(90 + A) \right] - \left[4 \sin(90 + A) \cos^3(90 - A) \right] \right\}}{\cos\left(\frac{180 + 8A}{2}\right)} ?$$

- (a) 1 (b) -1 (c) 0 (d) 2

Ans: (b)

Q) If the sides of a triangle are 6cm, 10cm and 14 cm, then what is the largest angle included by the sides?

- (a) 90° (b) 120°
(c) 135° (d) 150°

Q) If the sides of a triangle are 6cm, 10cm and 14 cm, then what is the largest angle included by the sides?

- (a) 90° (b) 120°
(c) 135° (d) 150°

Ans: (b)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $(\sin x + \operatorname{cosec} x)^2 + (\cos x + \sec x)^2$
 $= k + \tan^2 x + \cot^2 x,$

then what is the value of k ?

(a) 8

(b) 7

(c) 4

(d) 3

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If $(\sin x + \operatorname{cosec} x)^2 + (\cos x + \sec x)^2$
 $= k + \tan^2 x + \cot^2 x,$

then what is the value of k ?

(a) 8

(b) 7

(c) 4

(d) 3

Ans: (b)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) Let $0 < x < \frac{\pi}{4}$ then $(\sec 2x - \tan 2x)$ equals

(a) $\tan\left(x - \frac{\pi}{4}\right)$

(b) $\tan\left(\frac{\pi}{4} - x\right)$

(c) $\tan\left(x + \frac{\pi}{4}\right)$

(d) $\tan^2\left(x + \frac{\pi}{4}\right)$

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) Let $0 < x < \frac{\pi}{4}$ then $(\sec 2x - \tan 2x)$ equals

(a) $\tan\left(x - \frac{\pi}{4}\right)$

(b) $\tan\left(\frac{\pi}{4} - x\right)$

(c) $\tan\left(x + \frac{\pi}{4}\right)$

(d) $\tan^2\left(x + \frac{\pi}{4}\right)$

Ans: (b)

Q) If $\cos \theta + \sec \theta = k$, then what is the value of $\sin^2 \theta - \tan^2 \theta$?

- (a) $4 - k$ (b) $4 - k^2$ (c) $k^2 - 4$ (d) $k^2 + 2$

Q) If $\cos \theta + \sec \theta = k$, then what is the value of $\sin^2 \theta - \tan^2 \theta$?

- (a) $4 - k$ (b) $4 - k^2$ (c) $k^2 - 4$ (d) $k^2 + 2$

Ans: (b)

Q) If $\sin \theta + \cos \theta = \sqrt{2}$, then what is $\sin^6 \theta + \cos^6 \theta + 6 \sin^2 \theta \cos^2 \theta$ equal to?

(a) $\frac{1}{4}$

(b) $\frac{3}{4}$

(c) 1

(d) $\frac{7}{4}$

Q) If $\sin \theta + \cos \theta = \sqrt{2}$, then what is $\sin^6 \theta + \cos^6 \theta + 6 \sin^2 \theta \cos^2 \theta$ equal to?

(a) $\frac{1}{4}$

(b) $\frac{3}{4}$

(c) 1

(d) $\frac{7}{4}$

Ans: (d)

Q) What is $\frac{\sin^6 \theta - \cos^6 \theta}{\sin^2 \theta - \cos^2 \theta}$ equal to?

(a) $\sin^4 \theta - \cos^4 \theta$

(b) $1 - \sin^2 \theta \cos^2 \theta$

(c) $1 + \sin^2 \theta \cos^2 \theta$

(d) $1 - 3 \sin^2 \theta \cos^2 \theta$

Q) What is $\frac{\sin^6 \theta - \cos^6 \theta}{\sin^2 \theta - \cos^2 \theta}$ equal to?

- (a) $\sin^4 \theta - \cos^4 \theta$ (b) $1 - \sin^2 \theta \cos^2 \theta$
(c) $1 + \sin^2 \theta \cos^2 \theta$ (d) $1 - 3 \sin^2 \theta \cos^2 \theta$

Ans: (b)

Q) The value of $\cot(45^\circ + \theta) \cot(45^\circ - \theta)$ is

- (a) -1 (b) 0 (c) 1 (d) ∞

Q) The value of $\cot(45^\circ + \theta) \cot(45^\circ - \theta)$ is

- (a) -1 (b) 0 (c) 1 (d) ∞

Ans: (c)

Q) What is the value of $\frac{1 - 2\sin^2 \theta \cos^2 \theta}{\sin^4 \theta + \cos^4 \theta} + 4$ equal to?

(a) 0

(b) 1

(c) 2

(d) 5

Q) What is the value of $\frac{1 - 2\sin^2 \theta \cos^2 \theta}{\sin^4 \theta + \cos^4 \theta} + 4$ equal to?

(a) 0

(b) 1

(c) 2

(d) 5

Ans: (d)

Q) The value of $\frac{\cos^3 20^\circ - \cos^3 70^\circ}{\sin^3 70^\circ - \sin^3 20^\circ}$ is

(a) $\frac{1}{2}$

(b) $\frac{1}{\sqrt{2}}$

(c) 1

(d) 2

Q) The value of $\frac{\cos^3 20^\circ - \cos^3 70^\circ}{\sin^3 70^\circ - \sin^3 20^\circ}$ is

- (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 1 (d) 2

Ans: (c)

Q) If the angles of a triangle are 30° and 45° and the included side is $(\sqrt{3} + 1)$ cm, then what is the area of the triangle ?

(a) $(\sqrt{3} + 1) \text{ cm}^2$

(b) $(\sqrt{3} + 3) \text{ cm}^2$

(c) $\frac{1}{2}(\sqrt{3} + 1) \text{ cm}^2$

(d) $2(\sqrt{3} + 1) \text{ cm}^2$

Q) If the angles of a triangle are 30° and 45° and the included side is $(\sqrt{3} + 1)$ cm, then what is the area of the triangle ?

(a) $(\sqrt{3} + 1)$ cm²

(b) $(\sqrt{3} + 3)$ cm²

(c) $\frac{1}{2}(\sqrt{3} + 1)$ cm²

(d) $2(\sqrt{3} + 1)$ cm²

Ans: (c)

Q) Consider the following :

1.
$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A$$

2.
$$(1 - \sin A - \cos A)^2 = 2(1 - \sin A)(1 + \cos A)$$

Which of the above is/are identity/identities?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Q) Consider the following :

1.
$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A$$

2.
$$(1 - \sin A - \cos A)^2 = 2(1 - \sin A)(1 + \cos A)$$

Which of the above is/are identity/identities?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (c)

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If α and β are positive angles such that $\alpha + \beta = \frac{\pi}{4}$, then

what is $(1 + \tan \alpha)(1 + \tan \beta)$ equal to?

(a) 0

(b) 1

(c) 2

(d) 3

CDS & AFCAT 2 2024 LIVE CLASS - MATHS - PART 3

Q) If α and β are positive angles such that $\alpha + \beta = \frac{\pi}{4}$, then

what is $(1 + \tan \alpha)(1 + \tan \beta)$ equal to?

(a) 0

(b) 1

(c) 2

(d) 3

Ans: (c)

Q) If $2 \cos^2 x + 3 \sin x - 3 = 0$, $0 \leq x \leq 180^\circ$ the value of x is

(a) $30^\circ, 90^\circ, 150^\circ$

(b) $60^\circ, 120^\circ, 180^\circ$

(c) $0^\circ, 30^\circ, 150^\circ$

(d) $45^\circ, 90^\circ, 135^\circ$

Q) If $2 \cos^2 x + 3 \sin x - 3 = 0$, $0 \leq x \leq 180^\circ$ the value of x is

(a) $30^\circ, 90^\circ, 150^\circ$

(b) $60^\circ, 120^\circ, 180^\circ$

(c) $0^\circ, 30^\circ, 150^\circ$

(d) $45^\circ, 90^\circ, 135^\circ$

Ans: (b)

Q) If $\operatorname{cosec} \theta - \sin \theta = p^3$ and $\sec \theta - \cos \theta = q^3$, then what is the value of $\tan \theta$?

(a) $\frac{p}{q}$

(b) $\frac{q}{p}$

(c) pq

(d) p^2q^2

Q) If $\operatorname{cosec} \theta - \sin \theta = p^3$ and $\sec \theta - \cos \theta = q^3$, then what is the value of $\tan \theta$?

(a) $\frac{p}{q}$

(b) $\frac{q}{p}$

(c) pq

(d) p^2q^2

Ans: (b)

Q) From an aeroplane flying about a river at an altitude of 1200 m, it is observed that the angles of depression of opposite points on the two banks of a river are 30° and θ . If the width of the river is 3000 m, then which one of the following is correct ?

- (a) $\theta < 30^\circ$ (b) $30^\circ < \theta < 45^\circ$
(c) $45^\circ < \theta < 60^\circ$ (d) $60^\circ < \theta < 90^\circ$

Q) From an aeroplane flying about a river at an altitude of 1200 m, it is observed that the angles of depression of opposite points on the two banks of a river are 30° and θ . If the width of the river is 3000 m, then which one of the following is correct ?

- (a) $\theta < 30^\circ$ (b) $30^\circ < \theta < 45^\circ$
(c) $45^\circ < \theta < 60^\circ$ (d) $60^\circ < \theta < 90^\circ$

Ans: (c)

Q) If $\cos \theta + \sec \theta = k$, then what is the value of $\sin^2 \theta - \tan^2 \theta$?

- (a) $4 - k$ (b) $4 - k^2$ (c) $k^2 - 4$ (d) $k^2 + 2$

Q) If $\cos \theta + \sec \theta = k$, then what is the value of $\sin^2 \theta - \tan^2 \theta$?

- (a) $4 - k$ (b) $4 - k^2$ (c) $k^2 - 4$ (d) $k^2 + 2$

Ans: (b)

CDS-AFCAT 2 2024

SSBCrack
EXAMS

LIVE

MATHS

GEOMETRY

CLASS 1



NAVJYOTI SIR