NDA 1 2025

LIVE

MATHS

TRIGONOMETRY

CLASS 2

NAVJYOTI SIR

Crack
EXAMS

09 Oct 2024 Live Classes Schedule

8:00AM	09 OCTOBER 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	09 OCTOBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:30AM	OVERVIEW ON SRT & SDT	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

11:30AM	GK - GEOGRAPHY MCQ CLASS	RUBY MA'AM
1:00PM	BIOLOGY - MCQ - CLASS 2	SHIVANGI MA'AM
4:00PM	MATHS - TRIGONOMETRY - CLASS 2	NAVJYOTI SIR
5:30PM	ENGLISH - SYNONYMS - CLASS 1	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	GK - GEOGRAPHY MCQ CLASS	RUBY MA'AM
1:00PM	BIOLOGY - MCQ - CLASS 2	SHIVANGI MA'AM
5:30PM	ENGLISH - SYNONYMS - CLASS 1	ANURADHA MA'AM
7:00PM	MATHS - AVERAGE - CLASS 1	NAVJYOTI SIR

AFCAT 1 2025 LIVE CLASSES

4:00PM	STATIC GK - INDIAN FESTIVALS & FOLK DANCES	DIVYANSHU SIR
5:30PM	ENGLISH - SYNONYMS - CLASS 1	ANURADHA MA'AM
7:00PM	MATHS - AVERAGE - CLASS 1	NAVJYOTI SIR

SSBCrack EXAMS

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SSBCrack EXAMS

FORMULAS FOR COMPOUND ANGLES

$0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$

$\sin 75^\circ$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$$

$$= \left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{2}\right) = \frac{\sqrt{3}+1}{2\sqrt{2}} = \sin 75^\circ$$

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\sin 15^\circ = \sin(45^\circ - 30^\circ) = \frac{\sqrt{3}-1}{2\sqrt{2}} //$$

$\rightarrow \cos(A-B) = \cos A \cos B + \sin A \sin B$

$\rightarrow \cos(A+B) = \cos A \cos B - \sin A \sin B$

$* \tan(A+B) = \dfrac{\sin(A+B)}{\cos(A+B)} = \dfrac{\sin A \cos B + \sin B \cos A}{\cos A \cos B - \sin A \sin B}$

Divide by $\cos A \cos B$,

$= \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$ //

SSBCrack EXAMS

FORMULAS FOR COMPOUND ANGLES

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} \qquad \tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$\cos 2A = \cos(A+A) = \cos A \cos A - \sin A \sin A$

(1) $\Rightarrow \cos^2 A - \sin^2 A$

(2) $\Rightarrow 1 - 2\sin^2 A$

(3) $\Rightarrow 2\cos^2 A - 1$

(4) $\Rightarrow \dfrac{1 - \tan^2 A}{1 + \tan^2 A}$

SSBCrack EXAMS

FORMULAS FOR COMPOUND ANGLES

$\sin 2A = \sin(A+A) = \sin A \cos A + \cos A \sin A$

(1) $= 2 \sin A \cos A$

(2) $= \dfrac{2 \tan A}{1 + \tan^2 A}$

$\tan 2A = \tan(A+A) = \dfrac{\tan A + \tan A}{1 - (\tan A)(\tan A)} = \dfrac{2 \tan A}{1 - \tan^2 A}$

$\rightarrow \quad \sin 2A = 2 \sin A \cos A$

$\sin A = 2 \sin \frac{A}{2} \cos \frac{A}{2}$; $\sin \frac{A}{2} = 2 \sin \frac{A}{4} \cos \frac{A}{4}$

(Half-angle)

SSBCrack EXAMS

FORMULAS FOR COMPOUND ANGLES

→ $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$

→ $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$

$\sin 3A = \sin(2A + A) = \sin 2A \cos A + \cos 2A \sin A$

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

$= 4\cos^2 A \sin A - \sin A$

$= 4(1 - \sin^2 A)\sin A - \sin A$

$= 3\sin A - 4\sin^3 A$

SSBCrack EXAMS

FORMULAS FOR COMPOUND ANGLES

$\cos 3A = 4\cos^3 A - 3\cos A$ $\quad\quad$ $\sin 3A = 3\sin A - 4\sin^3 A$

$\tan 3A = \tan(A + 2A)$

$$= \frac{\tan A + \tan 2A}{1 - \tan A \tan 2A} = \frac{\tan A + \frac{2\tan A}{1 - \tan^2 A}}{1 - \tan A\left(\frac{2\tan A}{1 - \tan^2 A}\right)} = \frac{3\tan A - \tan^3 A}{1 - 3\tan^2 A}$$

SSBCrack EXAMS

Find the value of $\tan(22\frac{1}{2})°$

Let $x = 22\frac{1}{2}°$ $\quad 2x = 2 \times 22\frac{1}{2} = 45°$ $\quad \tan x = y$

$$\tan 2x = \frac{2\tan x}{1-\tan^2 x}$$

$$\tan 45° = \frac{2y}{1-y^2}$$

$$1 = \frac{2y}{1-y^2} \Rightarrow y^2 + 2y - 1 = 0$$

$$y = \frac{-2 \pm \sqrt{4 - 4\times1\times-1}}{2}$$

$$= \frac{-2 \pm \sqrt{8}}{2}$$

$$= -1 \pm \sqrt{2}$$

$-1 + \sqrt{2}$

$-1 - \sqrt{2}$ (-ve → not possible)

$y = \tan 22\frac{1}{2}° = -1 + \sqrt{2} = \sqrt{2} - 1$

SSBCrack EXAMS

VALUES AT 18°

$5\theta = 90^\circ$

$\theta = 18^\circ \longrightarrow 2\theta + 3\theta = 90^\circ$

$2\theta = 90^\circ - 3\theta$

$\sin 2\theta = \sin(90^\circ - 3\theta)$

$\sin 2\theta = \cos 3\theta$

$2\sin\theta\cos\theta = 4\cos^3\theta - 3\cos\theta$

$2\sin\theta = 4\cos^2\theta - 3$

$2\sin\theta = 4 - 4\sin^2\theta - 3$

$4\sin^2\theta + 2\sin\theta - 1 = 0$

$$\sin\theta = \frac{-2 \pm \sqrt{4 - 4 \times 4 \times -1}}{8}$$

$$= \frac{-2 \pm \sqrt{20}}{8} = \frac{-1 \pm \sqrt{5}}{4}$$

As $\sin 18^\circ > 0$,

So, $\frac{-1 + \sqrt{5}}{4}$

$$\sin 18^\circ = \frac{\sqrt{5} - 1}{4}$$

$$\sin 18^\circ = \frac{\sqrt{5}-1}{4} = \cos 72^\circ$$

$$\cos 18^\circ = \sqrt{1-\sin^2 18^\circ} = \sqrt{1-\left(\frac{\sqrt{5}-1}{4}\right)^2}$$

$$\tan 18^\circ = \frac{\sin 18^\circ}{\cos 18^\circ}$$

$$\sin 36^\circ = \sin 2(18^\circ) = 2\sin 18^\circ \cos 18^\circ$$

$$\cos 36^\circ = 1 - 2\sin^2 18^\circ =$$

SSBCrack EXAMS

VALUES FOR ANGLES LESS THAN 90°

	0°	15°	18°	30°	36°	45°	60°	90°
sine	0	$\frac{\sqrt{6}-\sqrt{2}}{4}$	$\frac{\sqrt{5}-1}{4}$	$\frac{1}{2}$	$\frac{\sqrt{10-2\sqrt{5}}}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cosine	1	$\frac{\sqrt{6}+\sqrt{2}}{4}$	$\frac{\sqrt{10+2\sqrt{5}}}{4}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{5}+1}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$2-\sqrt{3}$	$\frac{\sqrt{25-10\sqrt{5}}}{5}$	$\frac{1}{\sqrt{3}}$	$\sqrt{5-2\sqrt{5}}$	1	$\sqrt{3}$	not defined

EXAMPLE

Q. The value of $\cos 105° + \sin 105°$ is

(a) 1

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

(c) $\frac{1}{\sqrt{2}}$ ✓

(d) $\sqrt{2}$

$\cos(180° - 75°) + \sin(180° - 75°)$

$-\cos 75° + \sin 75°$

$-\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right) + \left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)$

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

EXAMPLE

Q. The value of $\cos 105° + \sin 105°$ is

(a) 1

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

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

(d) $\sqrt{2}$

Ans: (c)

EXAMPLE

Q. The value of $\sqrt{3}\ \text{cosec}\ 20^\circ - \sec 20^\circ$ is equal to

(a) 2

(b) $\dfrac{2\sin 20^\circ}{\sin 40^\circ}$

(c) 4

(d) $\dfrac{4\sin 20^\circ}{\sin 40^\circ}$

EXAMPLE

Q. The value of $\sqrt{3}\ \text{cosec}\ 20^\circ - \sec 20^\circ$ is equal to

(a) 2

(b) $\dfrac{2\sin 20^\circ}{\sin 40^\circ}$

(c) 4

(d) $\dfrac{4\sin 20^\circ}{\sin 40^\circ}$

Ans: (c)

EXAMPLE

Q. What is $\sqrt{1+\sin 2\theta}$ equal to ?

(a) $\cos\theta - \sin\theta$ (b) $\cos\theta + \sin\theta$

(c) $2\cos\theta + \sin\theta$ (d) $\cos\theta + 2\sin\theta$

EXAMPLE

Q. What is $\sqrt{1+\sin 2\theta}$ equal to ?

(a) $\cos\theta - \sin\theta$ (b) $\cos\theta + \sin\theta$

(c) $2\cos\theta + \sin\theta$ (d) $\cos\theta + 2\sin\theta$

Ans: (b)

EXAMPLE

Q. What is $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}$ equal to?

(a) $\cos A$ (b) $\cos(2A)$

(c) $2\cos(A/2)$ (d) $\sqrt{2\cos A}$

EXAMPLE

Q. What is $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}$ equal to?

(a) $\cos A$ (b) $\cos(2A)$

(c) $2\cos(A/2)$ (d) $\sqrt{2\cos A}$

Ans: (c)

SSBCrack EXAMS

OTHER FORMULAS

$$\sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$$

$$\sin A - \sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$$

$$\cos A + \cos B = 2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$$

$$\cos A - \cos B = -2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right) = 2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{B-A}{2}\right)$$

SSBCrack EXAMS

OTHER FORMULAS

$$2\cos A \cos B = \cos(A+B) + \cos(A-B)$$

$$-2\sin A \sin B = \cos(A+B) - \cos(A-B)$$

$$2\sin A \cos B = \sin(A+B) + \sin(A-B)$$

$$2\cos A \cos B = \sin(A+B) - \sin(A-B)$$

EXAMPLE

Q. What is the value of $\dfrac{(\cos 10^\circ + \sin 20^\circ)}{(\cos 20^\circ - \sin 10^\circ)}$?

(a) $\dfrac{1}{\sqrt{3}}$ (b) $-\dfrac{1}{\sqrt{3}}$

(c) $\sqrt{3}$ ✓ (d) $-\sqrt{3}$

$$\frac{\cos 10^\circ + \cos 70^\circ}{\cos 20^\circ - \cos 80^\circ}$$

$$= \frac{2\cos\left(\frac{70^\circ+10^\circ}{2}\right)\cos\left(\frac{10^\circ-70^\circ}{2}\right)}{-2\sin\left(\frac{20^\circ+80^\circ}{2}\right)\sin\left(\frac{20^\circ-80^\circ}{2}\right)}$$

$$= \frac{\cos 40^\circ \cos 30^\circ}{+\sin 50^\circ \sin 30^\circ}$$

$(\cos(-\theta) = \cos\theta)$

$(\sin(-\theta) = -\sin\theta)$

$$\frac{\cos 90^\circ \quad \cos 30^\circ}{\sin 90^\circ \quad \sin 30^\circ}$$

$(\cos\theta = \sin(90^\circ - \theta))$

$= \cot 30^\circ = \sqrt{3}$

EXAMPLE

Q. What is the value of $\dfrac{(\cos 10^\circ + \sin 20^\circ)}{(\cos 20^\circ - \sin 10^\circ)}$?

(a) $\dfrac{1}{\sqrt{3}}$

(b) $-\dfrac{1}{\sqrt{3}}$

(c) $\sqrt{3}$

(d) $-\sqrt{3}$

Ans: (c)

EXAMPLE

Q. If $A = \frac{41\pi}{12}$, then what is the value of $\frac{(1) - 3\tan^2 A}{3\tan A - \tan^3 A}$?

(a) –1 (b) 1

(c) 1/3 (d) 3

$\frac{1}{\tan 3A} = \frac{1}{1} = 1$

$\tan 3A = \tan 3\left(\frac{41\pi}{12}\right) = \tan\left(\frac{41\pi}{4}\right)$

$= \tan\left(\frac{10\pi}{} + \frac{\pi}{4}\right) = \tan\frac{\pi}{4} = 1$

$(n(2\pi) + \theta)$ $\frac{\pi}{4}$ 1st quad.

EXAMPLE

Q. If $A = \frac{41\pi}{12}$, then what is the value of $\frac{1-3\tan^2 A}{3\tan A - \tan^3 A}$?

(a) -1 (b) 1

(c) $1/3$ (d) 3

Ans: (b)

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