Foundation Batch

MATHS

Trigonometry

Part -9

LIVE 12-11-2024 07:00PM

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

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

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

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

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

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

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

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

$$+\left[\cos(A-B) - \cos(A+B)\right] = +2\sin A \sin B$$

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

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

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

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

Imp

$$\sin C + \sin D = 2\sin\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right)$$

$$\sin C - \sin D = 2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$$

$$\cos C + \cos D = 2\cos\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right)$$

$$\cos C - \cos D = 2\sin\left(\frac{C+D}{2}\right)\sin\left(\frac{D-C}{2}\right)$$

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

$A = B$

$\sin 2A = \sin A \cdot \cos A + \cos A \cdot \sin A$

$= 2 \sin A \cos A$

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

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

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

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

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

$$\sin 2A = 2\sin A \cdot \cos A$$

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

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

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

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

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

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

$$\cos 3A = 4\cos^3 A - 3\cos^2 A$$

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

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

Find $(\alpha+\beta)$, if $\tan\alpha=\frac{m}{m+1}$ and $\tan\beta=\frac{1}{2m+1}$?

यदि $\tan\alpha=\frac{m}{m+1}$ और $\tan\beta=\frac{1}{2m+1}$ है, तो $(\alpha+\beta)$ ज्ञात कीजिये।

(a) 0

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

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

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

$$\tan(\alpha+\beta)=\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\cdot\tan\beta}$$

$$\tan(\alpha+\beta)=1$$

$$\alpha+\beta=45^\circ$$

$$=\frac{\pi}{4}$$

$$\frac{\frac{m}{m+1}+\frac{1}{(2m+1)}}{1-\frac{m}{m+1}\times\frac{1}{2m+1}}=\frac{2m^2+m+m+1}{(m+1)(2m+1)}$$

$$\frac{(m+1)(2m+1)-m}{(m+1)(2m+1)}$$

$$\frac{2m^2+2m+1}{2m^2+m+2m+1}$$

$$\frac{2m^2+2m+1}{2m^2+2m+1}$$

1

Find $(\alpha+\beta)$, if $\tan\alpha = \frac{m}{m+1}$ and $\tan\beta = \frac{1}{2\,m+1}$?

यदि $\tan\alpha = \frac{m}{m+1}$ और $\tan\beta = \frac{1}{2\,m+1}$ है, तो $(\alpha+\beta)$ ज्ञात कीजिये।

(a) 0

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

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

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

$$\tan(\alpha+\beta) = \frac{\tan\alpha+\tan\beta}{1-\tan\alpha\cdot\tan\beta}$$

Put = 1

$\tan\alpha = \frac{1}{2}$

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

$\tan(\alpha+\beta) = 1$

$\alpha+\beta = 45^\circ = \frac{\pi}{4}$

$$\frac{\frac{1}{2}+\frac{1}{3}}{1-\frac{1}{2}\times\frac{1}{3}} = \frac{\frac{5}{6}}{\frac{5}{6}} = 1$$

102. $\cos 18^\circ - \sin 18^\circ$

(a) $\sqrt{2}\sin 18^0$

(b) $\sqrt{2}\sin 27^\circ$

(c) $\sqrt{2}\cos 18^\circ$

(d) None of these

$\cos 18^\circ - \sin(90-72)$

$\cos 18 - \cos 72^\circ$

$2\sin\frac{18+72}{2}\sin\frac{72-18}{2}$

$2\sin 45^\circ \sin 27^\circ$

$2\times\frac{1}{\sqrt{2}}\times\sin 27$

$\sqrt{2}\sin 27^\circ$

$\cos C - \cos D = 2\sin\frac{C+D}{2}\cdot\sin\frac{D-C}{2}$

(4) H.W

117. Using $2\cos A \cdot \cos B = \cos(A+B) + \cos(A-B)$ find the value of $\cos 75^\circ \cos 15^\circ$.

$2\cos A \cdot \cos B = \cos(A+B) + \cos(A-B)$ के उपयोग से, $\cos 75^\circ \cos 15^\circ$ का मान ज्ञात कीजिए।

(a) $1/2$

(b) $1/4$

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

(d) $\frac{\sqrt{3}}{4}$

118. $\sin 15^\circ + \sin 75^\circ = ?$

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

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

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

(d) $\sqrt{3}$

$\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$

$= 2\sin 45^\circ \times \cos 30^\circ$

$2 \times \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2}$

$= \frac{\sqrt{3}}{\sqrt{2}}$

119. $\sin 15^\circ + \sin 165^\circ = ?$

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

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

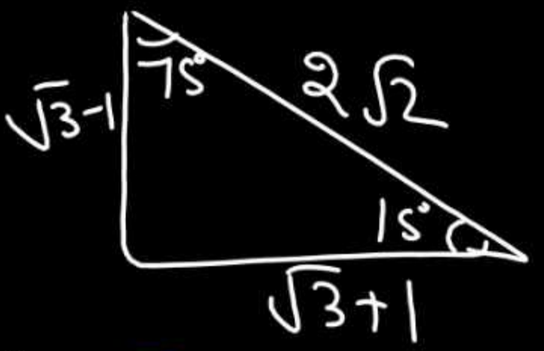
(c) $\frac{\sqrt{3}+1}{2}$

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

$\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$

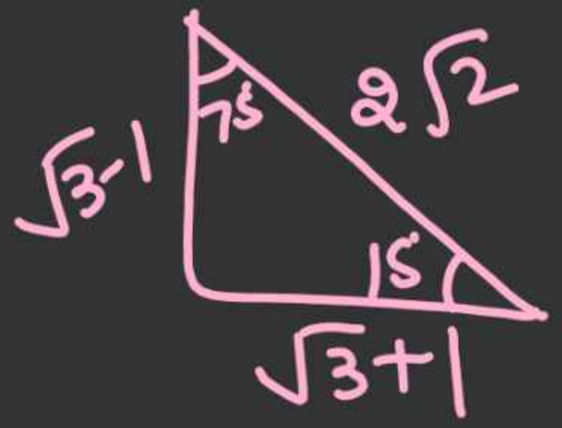
$2 \times \sin 90^\circ \cdot \cos 75^\circ$

$2\cos 75^\circ$



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

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



120. $\tan 15^\circ - \cot 165^\circ = ?$

(a) $2\sqrt{3}$

(b) 4

(c) 2

(d) 0

$\tan 15^\circ - \cot(180-15)$

$\tan 15^\circ - (-\cot 15^\circ)$

$\tan 15^\circ + \cot 15^\circ$

$$\frac{\sqrt{3}-1}{\sqrt{3}+1} + \frac{\sqrt{3}+1}{\sqrt{3}-1}$$

$$\frac{(\sqrt{3}-1)^2 + (\sqrt{3}+1)^2}{3-1} = \frac{4-2\sqrt{3}+4+2\sqrt{3}}{2} = \frac{8}{2} = 4$$

121. $\frac{\sin 4\theta+\sin 2\theta}{\cos 4\theta+\cos 2\theta} = ?$

(a) $\tan 3\theta$

(b) $\cot 3\theta$

(c) $\tan \theta$

(d) $\cot \theta$

$$\frac{2\sin 3\theta \cos\theta}{2\cos 3\theta \cos\theta}$$

$$= \tan 3\theta$$

(SSC CHSL Pre. 27/05/2022)

122. $\sin 10^\circ + \sin 20^\circ + \sin 40^\circ + \sin 50^\circ = ?$

(a) $2\sin 15^\circ \cos 5^\circ$

(b) $2\cos 15^\circ \sin 5^\circ$

(c) $2\sin 15^\circ \sin 5^\circ$

(d) $2\cos 15^\circ \cos 5^\circ$

$\sin 10 + \sin 50 + \sin 20 + \sin 40$

$2\sin 30 \times \cos 20 + 2\sin 30 \cos 10$

$2\sin 30 \left[\cos 20 + \cos 10\right]$

$2 \times \frac{1}{2}$

$2\cos 15 \cdot \cos 5$

123. $\cot x(\sin 5x - \sin 3x) = ?$

(a) $2\cos 3x\cos 2x$

(b) $2\cos 2x\cos x$

(c) $2\cos 4x\cos x$

(d) $2\cos 5x\cos 3x$

$\sin C - \sin D = 2\cos\frac{C+D}{2}\sin\frac{C-D}{2}$

$\cot x\left(2\cos 4x \cdot \sin x\right)$

$\frac{\cos x}{\sin x} \times 2\cos 4x \cdot \sin x$

$= 2\cos x \cdot \cos 4x$

124. $\frac{\cos 7A+\cos 11A}{\cos 7A-\cos 11A}=?$

(a) 1

(b) $\frac{\cot 9A}{\tan 2A}$

(c) $\frac{\tan 9A}{\tan 2A}$

(d) $\frac{\tan 9A}{\cot 2A}$

$$\frac{2\cos 9A\cos 2A}{2\sin 9A\times\sin 2A}$$

$$\frac{\cot 9A}{\left(\frac{\sin 2A}{\cos 2A}\right)}=\frac{\cot 9A}{\tan 2A}$$

125. What is the value of $[(\sin 7x - \sin 5x) \div (\cos 7x + \cos 5x)] - [(\cos 6x - \cos 4x) \div (\sin 6x + \sin 4x)] = ?$

$[(\sin 7x - \sin 5x) \div (\cos 7x + \cos 5x)] - [(\cos 6x - \cos 4x) \div (\sin 6x + \sin 4x)]$ का मान क्या है?

(a) 1

(b) $2\tan x$

(c) $\tan 2x$

(d) $\tan\left(\frac{3x}{2}\right)$