

TRIGONOMETRY

त्रिकोणमिति

SHEET-05

CLASS NOTES

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Multiple and Sub-multiple Trigonometric function of 2A

(2A के गुणक तथा उपगुणक त्रिकोणमितीय फलन)

$$\sin 2A = 2 \sin A \cdot \cos A = \frac{2 \tan A}{1 + \tan^2 A}$$

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

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

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

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

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

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

$$1 + \cos A = 2 \cos^2 \frac{A}{2}$$

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

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

$$\cot 2A = \frac{\cot^2 A - 1}{2 \cot A}$$

2θ

$$* \sin 2A = 2 \sin A \cos A = \frac{2 \tan \theta}{1 + \tan^2 \theta}$$

$$\begin{aligned} * \cos 2A &= \cos^4 \theta - \sin^4 \theta \\ &= \cos^2 \theta - \sin^2 \theta \\ &= 1 - 2 \sin^2 \theta \\ &= 2 \cos^2 \theta - 1 \\ &= \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} \end{aligned}$$

$$* \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

Trigonometric function of 3A (3A के त्रिकोणमितीय फलन)

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

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

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

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

1. If $2(\cos^2\theta - \sin^2\theta) = 1$ (θ is a positive acute angle), then $\cot\theta$ is equal to :

(a) $-\sqrt{3}$

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

(c) 1

(d) $\sqrt{3}$



$2 \times \cos 2\theta = 1$

$\therefore \cos 2\theta = \frac{1}{2} = \cos 60^\circ$

~~$\theta = 60^\circ$~~ 30°

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

2. The value of

$$\left(\frac{2 \cos^3 \theta - \cos \theta}{\sin \theta - 2 \sin^3 \theta} \right)^2 + 1, \theta \neq 45^\circ \text{ is:}$$

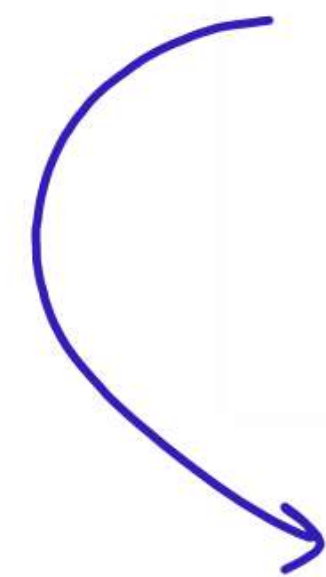
SSC CPO 28/06/2024 (Shift-03)

(a) $\sin^2 \theta$

(b) $\sec^2 \theta$

☒ (c) $\operatorname{cosec}^2 \theta$

(d) $\cot^2 \theta$


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

$$= \cot^2 \theta + 1$$

$$= \operatorname{cosec}^2 \theta$$

3. Simplify the following expression

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

SSC CGL 21/07/2023 (Shift-03)

☒ (a) $\tan \theta$

(b) $\sin \theta$

(c) $\sec \theta$

(d) $\cos \theta$

$$\begin{aligned} &= \frac{S(1-2S^2)}{C(2C^2-1)} \\ &= \tan \theta \end{aligned}$$

$$Q. \sqrt{2 + \sqrt{2 + 2\cos 4\theta}}$$

$$\text{Ans } \sqrt{2 + \sqrt{2(1 + \cos 4\theta)}}$$

$$= \sqrt{2 + \sqrt{2 \times 2 \cos^2 2\theta}}$$

$$= \sqrt{2 + 2\cos 2\theta}$$

$$= \sqrt{2(1 + \cos 2\theta)}$$

$$= \sqrt{2 \times 2 \cos^2 \theta}$$

$$= \underline{2\cos \theta}$$

$$\text{Trick: } 2\cos \theta$$

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

$$1 + \cos 4\theta = 2\cos^2 2\theta$$

4. Evaluate the following:

$$\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8\theta}}}$$

(Handwritten red annotations: θ under 2, 2θ under 2, 4θ under 2, and 8θ under $\cos$)

SSC CGL 27/07/2023 (Shift-3)

(a) ~~$2\cos\theta$~~

(c) $\sin 2\theta$

(b) $2\cos 2\theta$

(d) $\cos 2\theta$

(Handwritten red arrow from the expression above to this result)
 $= 2\cos\theta$

$$4 \tan \theta = 3$$

$$\tan \theta = \frac{3}{4}$$

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

$$= \frac{\cancel{1} - \cancel{1} + 2 \sin^2 \theta}{\cancel{1} + 2 \cos^2 \theta - \cancel{1}} = \tan^2 \theta = \frac{9}{16}$$

5. If $4 \tan \theta - 3 = 0$, then the value of $\frac{1 - \cos 2\theta}{1 + \cos 2\theta}$ is?

SSC CGL 23/09/2024 (Shift-01)

(a) 1

(b) $\frac{7}{15}$

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

(d) $\frac{9}{16}$

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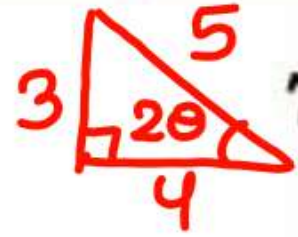
6. $\frac{2 \tan A}{1 + \tan^2 A} = ?$

- (a) $\cos 2A$
(c) $\cos A$

SSC CGL 20/07/2023 (Shift-02)

- (b) $\sin A$
(d) $\sin 2A$

$$\cos 2\theta = \frac{4}{5}$$



7.

If $\cos^4\theta - \sin^4\theta$ = $\frac{4}{5}$, then find the value of $\sin 4\theta$.

$$\sin 4\theta = 2 \sin 2\theta \cos 2\theta$$

$$= 2 \times \frac{3}{5} \times \frac{4}{5} = \frac{24}{25}$$

(a) $\frac{24}{25}$

(c) $\frac{16}{25}$

SSC CHSL 08/07/2024 (Shift-04)

(b) $\frac{21}{25}$

(d) $\frac{18}{25}$

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

$$\sin 4\theta = 2 \sin 2\theta \cos 2\theta$$

$$\sin 6\theta = 2 \sin 3\theta \cos 3\theta$$

8. The value of $\frac{\sin 4\theta}{(1 - \cos 4\theta)}$ is:

SSC CHSL 01/06/2022 (Shift- 03)

(a) $\cot \theta$

✓ (b) $\cot 2\theta$

(c) $\tan \theta$

(d) $\tan 2\theta$

$$\begin{aligned}\frac{\sin 4\theta}{1 - \cos 4\theta} &= \frac{2 \sin 2\theta \cos 2\theta}{1 - (1 - 2 \sin^2 2\theta)} = \frac{\cancel{2} \cancel{\sin 2\theta} \cos 2\theta}{\cancel{1} - \cancel{1} + \cancel{2} \sin^2 2\theta} \\ &= \underline{\cot 2\theta}\end{aligned}$$

$$\cos 15^\circ = \frac{(\sqrt{3}+1)}{2\sqrt{2}}$$

$$\begin{aligned}\cos^2 15^\circ &= \frac{(\sqrt{3}+1)^2}{8} \\ &= \frac{(3+1+2\sqrt{3})}{8} \\ &= \frac{(4+2\sqrt{3})}{8} \\ &= \left(\frac{2+\sqrt{3}}{4}\right)\end{aligned}$$

9. What is the value of $\cos^2 15^\circ$?

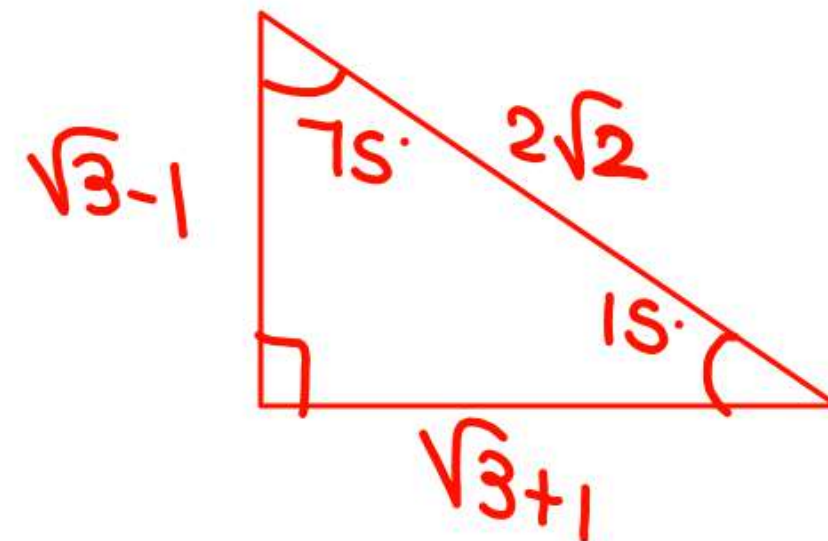
SSC CGL 06/12/2022 (Shift- 04)

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

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

(b) $\frac{(2 + \sqrt{3})}{4}$

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



10. What is the value of $\operatorname{cosec} 15^\circ \sec 15^\circ$

SSC CGL 13/12/2022 (Shift- 02)

(a) 0.5

(c) 2

☒ (b) 4

(d) 1

$$\text{ans} = \frac{2 \times 1}{2 \times \sin 15^\circ} \times \frac{1}{\cos 15^\circ}$$

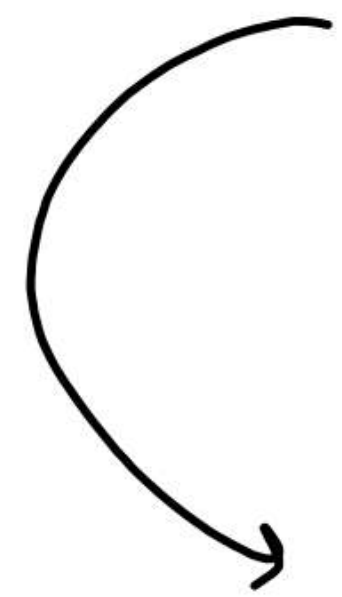
$$= \frac{2}{\sin 30^\circ}$$

$$= \frac{2}{\frac{1}{2}} = 4$$

11. What is the value of the expression $100(\sin 15^\circ \cos 15^\circ)$?

SSC CHSL 03/06/2022 (Shift- 03)

- (a) 50
- (b) 75
- (c) 100
- (d) 25



$100 \times \frac{2}{2} \times \sin 15^\circ \times \cos 15^\circ$

So
 $= \frac{100 \times \sin 30^\circ}{2}$
 $= \frac{25 \times 1}{2}$

$$\frac{1 - \tan^2 22.5}{1 + \tan^2 22.5} = \cos 45^\circ = \frac{1}{\sqrt{2}}$$

12. Find the value of $\frac{1 - \tan^2 22\frac{1}{2}^\circ}{1 + \tan^2 22\frac{1}{2}^\circ}$ is :

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

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

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

(d) $\sqrt{3}$

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

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

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

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

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

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

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

$$* \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

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

$$\bullet \cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$$

13. Find the value of $3\sin 15^\circ - 4\sin^3 15^\circ$.

SSC CGL 25/09/2024 (Shift-03)

(a) 2

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

☒ (c) $\frac{1}{\sqrt{2}}$

(d) $\sqrt{2}$

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

$$= \sin 3\theta$$

$$= \sin 45^\circ = \frac{1}{\sqrt{2}}$$

$$* \sqrt{\frac{1-s}{1+s}} = \sec\theta - \tan\theta$$

$$* \sqrt{\frac{1+s}{1-s}} = \sec\theta + \tan\theta$$

$$* \sqrt{\frac{1-c}{1+c}} = \operatorname{cosec}\theta - \cot\theta$$

$$* \sqrt{\frac{1+c}{1-c}} = \operatorname{cosec}\theta + \cot\theta$$

14. Find the value of $\sqrt{\frac{1 - \sin 3\theta}{1 + \sin 3\theta}}$

SSC CGL TIER I 21/07/2023 (Shift-02)

- (a) ☒ $\sec 3\theta - \tan 3\theta$ (b) $(\sec 3\theta - \tan 3\theta)^2$
(c) $(\sec 3\theta - \tan 3\theta)^3$ (d) $\sec 3\theta + \tan 3\theta$

ans = $\sec 3\theta - \tan 3\theta$

15. What is the value of $(4\sin^3 x - 3\sin x + \sin 3x)$?

SSC CHSL 31/05/2022 (Shift- 02)

(a) 1

~~(b) 0~~

(c) 4

(d) 3

$$= (4s^3 - 3s) + \sin 3x$$

$$= -(3s - 4s^3) + \sin 3x$$

$$= -\cancel{\sin 3x} + \cancel{\sin 3x}$$

$$= 0$$

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

$$\theta = 60^\circ$$

$$\therefore \cos 180^\circ = -1$$

16. If $\sin \theta = \frac{\sqrt{3}}{2}$, and θ is an acute angle, find the value of $\cos 3\theta$.

SSC CHSL 10/06/2022 (Shift- 01)

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

(c) -1

(b) 1

(d) 0

$$\boxed{\theta = 180^\circ}$$

$$\sin 180^\circ = 0$$

$$\cos 180^\circ = -1$$

$$\tan 180^\circ = 0$$

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

SSC CGL 06/12/2022 (Shift- 03)

- (a) 0
(c) 2

- (b) 1
(d) -1

$$\sin\theta = \frac{1}{2}$$

$$\theta = 30^\circ$$

$$-(4\cos^3\theta - 3\cos\theta)$$

$$= -\cos 3\theta$$

$$= -\cos 90^\circ$$

$$= 0$$

18. What will be the value of $\sin 10^\circ - \frac{4}{3} \sin^3 10^\circ$?

SSC CGL 06/12/2022 (Shift-01)

$$\begin{aligned} & \sin 10^\circ - \frac{4}{3} \sin^3 10^\circ \\ &= \frac{3 \sin 10^\circ - 4 \sin^3 10^\circ}{3} \\ &= \frac{\sin 30^\circ}{3} = \frac{1}{2 \times 3} = \frac{1}{6} \end{aligned}$$

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

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

 (b) $\frac{1}{6}$

(d) $\frac{\sqrt{3}}{6}$

Identities based on Sum & Difference of angle of T-Ratio

(त्रिकोणमिति अनुपात के कोणों का योग तथा
अंतर पर आधारित सर्वसमिकाएँ)

$$\cancel{\text{✎}} \quad \sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\cancel{\text{✎}} \quad \sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\cancel{\text{✎}} \quad \cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\cancel{\text{✎}} \quad \cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\cancel{\text{✎}} \quad \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\cancel{\text{✎}} \quad \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

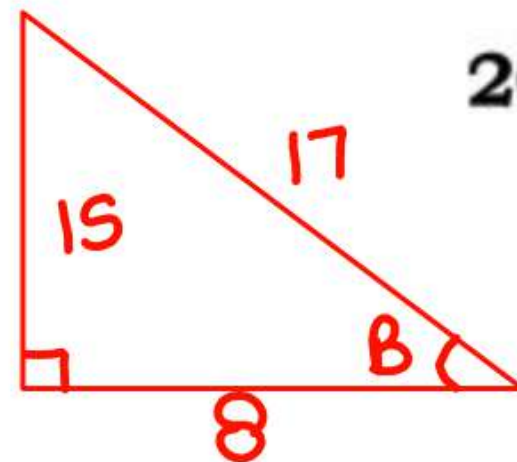
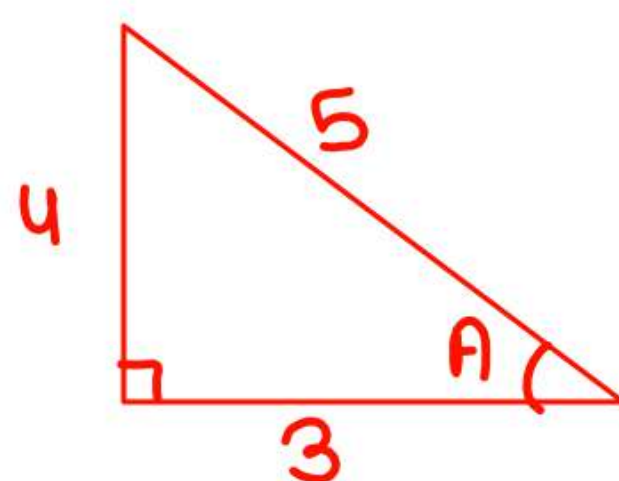
$$\cancel{\text{✎}} \quad \cot(A + B) = \frac{\cot A \cot B - 1}{\cot B + \cot A}$$

$$\cancel{\text{✎}} \quad \cot(A - B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$$

19. Which of the following options gives an expression equivalent to $\sin(A + B)$?

SSC CGL 24/07/2023 (Shift-2)

- (a) $\cos A \cos B - \sin A \sin B$
- ✓ (b) $\sin A \cos B + \cos A \sin B$
- (c) $\cos A \cos B + \sin A \sin B$
- (d) $\sin A \cos B - \cos A \sin B$



20. If $\sin A = \frac{4}{5}$ and $\sin B = \frac{15}{17}$, what is the value of $\sin(A - B)$?

SSC CGL 02/12/2022 (Shift- 04)

(a) $-\frac{32}{45}$

(c) $\frac{13}{85}$

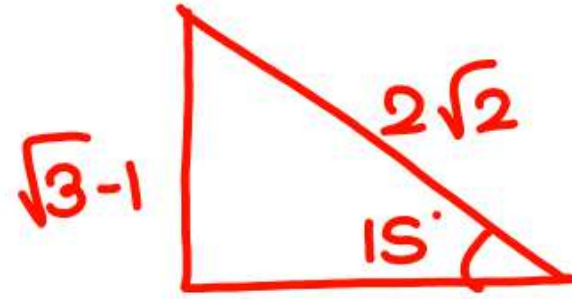
(b) $-\frac{13}{85}$

(d) $\frac{32}{45}$

$$\begin{aligned}\sin(A - B) &= \sin A \cos B - \cos A \sin B \\ &= \frac{4}{5} \times \frac{8}{17} - \frac{3}{5} \times \frac{15}{17} \\ &= -\frac{13}{85}\end{aligned}$$

21. What is the value of $\cos 45^\circ \sin 15^\circ$?

SSC CGL 07/12/2022 (Shift- 02)



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

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

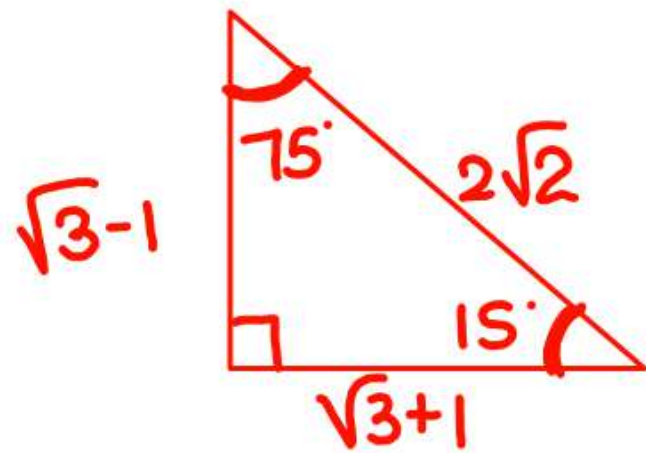
(b) $\frac{(\sqrt{3}-1)}{4}$

(d) $2\sqrt{3}-1$

$$\begin{aligned} & \frac{1}{\sqrt{2}} \times \frac{(\sqrt{3}-1)}{2\sqrt{2}} \\ &= \frac{(\sqrt{3}-1)}{4} \end{aligned}$$

22. What is the value of $\sin 75^\circ + \sin 15^\circ$?

SSC CGL 09/12/2022 (Shift- 04)



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

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

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

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

$$\begin{aligned} & \sin 75^\circ + \sin 15^\circ \\ &= \frac{\sqrt{3}+1}{2\sqrt{2}} + \frac{\sqrt{3}-1}{2\sqrt{2}} \\ &= \frac{\cancel{\sqrt{3}}+1+\cancel{\sqrt{3}}-1}{\cancel{2}\sqrt{2}} \\ &= \frac{2\sqrt{3}}{2\sqrt{2}} \\ &= \frac{\sqrt{3}}{\sqrt{2}} \end{aligned}$$

$$\begin{aligned}
 &= -(\cos 25^\circ \cos 65^\circ - \sin 25^\circ \sin 65^\circ) \\
 &= -(\cos 90^\circ) \\
 &= \underline{\underline{0}}
 \end{aligned}$$

23. Evaluate the following
 $+\sin 25^\circ \sin 65^\circ - \cos 25^\circ \cos 65^\circ.$

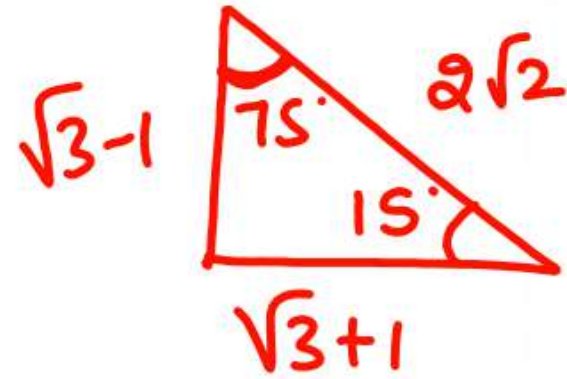
SSC CGL 14/07/2023 (Shift-2)

- (a) 40
- (b) 4
- (c) ~~0~~
- (d) 1

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

24. Using $\cos(A + B) = \cos A \cos B - \sin A \sin B$, find the value of $\cos 75^\circ$

SSC CGL 17/07/2023 (Shift-03)



$$\cos 75^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}} = \frac{\sqrt{6}-\sqrt{2}}{4}$$

(a) $\frac{\sqrt{5}-1}{4}$

(b) $\frac{\sqrt{5}+1}{4}$

✓ (c) $\frac{\sqrt{6}-\sqrt{2}}{4}$

(d) $\frac{\sqrt{6}+\sqrt{2}}{4}$

25. What is the value of $\cos(x+y) - \sin(x-y) + \tan(2z)$?

SSC CHSL 02/07/2024 (Shift-01)

$$\cos(x+y) - \sin(x-y) + \tan 2z$$

$$= \cos x \cos y - \sin x \sin y - \sin x \cos y + \cos x \sin y + \frac{2 \tan z}{1 - \tan^2 z}$$

(a) $\cos x \cdot \cos y - \sin x \cdot \sin y - \sin x \cdot \cos y - \cos x \cdot \sin y + \frac{2 \tan z}{1 - \tan^2 z}$

✓ (b) $\cos x \cdot \cos y - \sin x \cdot \sin y - \sin x \cdot \cos y + \cos x \cdot \sin y + \frac{2 \tan z}{1 - \tan^2 z}$

(c) $\cos x \cdot \cos y - \sin x \cdot \sin y - \sin x \cdot \cos y + \cos x \cdot \sin y + \frac{\tan z}{1 - \tan^2 z}$

(d) $\sin x \cdot \sin y + \frac{2 \tan z}{1 - \tan^2 z}$

26. Using $\tan (A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$, find the value of $\tan 15^\circ$.

H.W

SSC CGL 18/07/2023 (Shift-04)

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

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

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

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

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

27. What will be the value of $\frac{\tan 45^\circ - \tan 15^\circ}{1 + \tan 45^\circ \tan 15^\circ}$?

SSC CGL 07/12/2022 (Shift-03)

(a) $\sqrt{3}$

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

✓ (c) $\frac{1}{\sqrt{3}}$

(d) $\sqrt{2}$

$$\tan(x-y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

$$\tan(x-y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

$$\Rightarrow \overset{\tan 45^\circ}{\tan(72^\circ - 27^\circ)} = \frac{\tan 72^\circ - \tan 27^\circ}{1 + \tan 72^\circ \tan 27^\circ}$$

$$\Rightarrow 1 + \tan 72^\circ \tan 27^\circ = \tan 72^\circ - \tan 27^\circ$$

$$\Rightarrow 1 = \tan 72^\circ - \tan 27^\circ - \tan 72^\circ \tan 27^\circ$$

28. Find the value of

$$\tan 72^\circ - \tan 27^\circ - \tan 72^\circ \tan 27^\circ.$$

(a) -1

(c) -2

(b) 1

(d) 0

SSC CGL 25/09/2024 (Shift-02)

$$72^\circ - 27^\circ = 45^\circ$$

28. Find the value of
 $\tan 72^\circ - \tan 27^\circ - \tan 72^\circ \tan 27^\circ$.

SSC CGL 25/09/2024 (Shift-02)

(a) -1

(c) -2

✓ (b) 1

(d) 0

$$\therefore 72 - 27 = 45$$

$$\tan 72 - \tan 27 - \tan 72 \tan 27 = 1$$

$$\text{If } (A-B)=45^\circ$$

$$\therefore \tan(A-B) = \tan 45^\circ$$

$$\Rightarrow \frac{\tan A - \tan B}{1 + \tan A \tan B} = 1$$

$$\Rightarrow \tan A - \tan B = 1 + \tan A \tan B$$

$$\Rightarrow \boxed{\tan A - \tan B - \tan A \tan B = 1}$$

$$\text{Ex } \tan 80^\circ - \tan 35^\circ - \tan 80^\circ \cdot \tan 35^\circ = 1$$

$$\text{Ex } \tan 55^\circ - \tan 10^\circ - \tan 55^\circ \cdot \tan 10^\circ = 1$$

$$\text{If } (A+B)=45^\circ$$

$$\tan(A+B) = \tan 45^\circ$$

$$\Rightarrow \frac{\tan A + \tan B}{1 - \tan A \tan B} = 1$$

$$\Rightarrow \tan A + \tan B = 1 - \tan A \tan B$$

$$\Rightarrow \boxed{\tan A + \tan B + \tan A \tan B = 1}$$

$$\text{Ex: } \tan 40^\circ + \tan 5^\circ + \tan 40^\circ \cdot \tan 5^\circ = 1$$

$$\text{Ex: } \tan 25^\circ + \tan 20^\circ + \tan 25^\circ \cdot \tan 20^\circ = 1$$

$$\text{If } A+B=45^\circ$$

$$\Rightarrow \boxed{B = 45^\circ - A}$$

$$\Rightarrow \tan B = \tan(45^\circ - A)$$

$$\Rightarrow \tan B = \frac{\tan 45^\circ - \tan A}{1 + \tan 45^\circ \tan A}$$

$$\boxed{\tan B = \frac{1 - \tan A}{1 + \tan A}}$$

$$\text{Ex: } \frac{1 - \tan 15^\circ}{1 + \tan 15^\circ} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\frac{1 - \tan 10^\circ}{1 + \tan 10^\circ} = \tan 20^\circ$$

$$\textcircled{Q}. \frac{1 - \tan A}{1 + \tan A} = \tan(45^\circ - A)$$

$$\textcircled{Q}. \frac{1 + \tan A}{1 - \tan A} = \tan(45^\circ + A)$$

$$\textcircled{Q}. \frac{1 - \tan 15^\circ}{1 + \tan 15^\circ} = \tan(45^\circ - 15^\circ) = \tan 30^\circ$$

$$\textcircled{Q}. \frac{1 + \tan 15^\circ}{1 - \tan 15^\circ} = \tan(45^\circ + 15^\circ) = \tan 60^\circ$$

29. Simplify: $\frac{\cos 13^\circ + \sin 13^\circ}{\cos 13^\circ - \sin 13^\circ}$

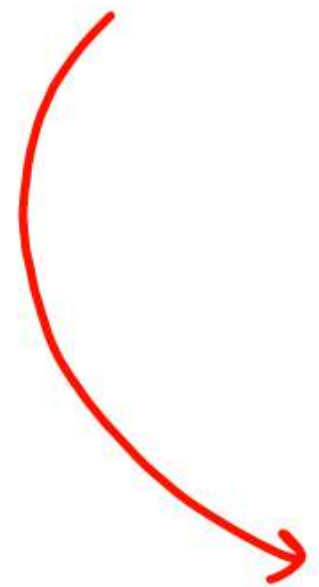
SSC CPO 28/06/2024 (Shift-01)

(a) $\cot 58^\circ$

(b) $\tan 32^\circ$

☒ (c) $\tan 58^\circ$

(d) $\cos 26^\circ$


$$\frac{1 + \tan 13^\circ}{1 - \tan 13^\circ} = \tan(45 + 13) = \tan 58^\circ$$

$$\begin{aligned} & \tan 2\alpha \\ &= \tan\{(A+B) + (A-B)\} \\ &= \frac{\tan(A+B) + \tan(A-B)}{1 - \tan(A+B)\tan(A-B)} \\ &= \frac{a+b}{1-ab} \end{aligned}$$

30. If $\tan(\alpha + \beta) = a$, $\tan(\alpha - \beta) = b$, then the value of $\tan 2\alpha$ is:

SSC CGL 13/12/2022 (Shift- 04)

(a) $\frac{a+b}{1-ab}$

(c) $\frac{a-b}{1+ab}$

(b) $\frac{a+b}{1+ab}$

(d) $\frac{a-b}{1-ab}$

✓ 31. Using $\cot (A - B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$, find the value of $\cot 15^\circ$.

SSC CGL 19/07/2023 (Shift-02)

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

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

(c) $\sqrt{3} - 1$

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

$$\tan(A+B) = 1$$

$$\therefore \tan(A+B) = 1$$

$$\Rightarrow \frac{\tan A + \tan B}{1 - \tan A \tan B} = 1$$

$$\Rightarrow \tan A + \tan B = 1 - \tan A \tan B$$

$$\Rightarrow \tan A (1 + \tan B) = 1 - \tan B$$

$$\Rightarrow \boxed{\tan A = \frac{1 - \tan B}{1 + \tan B}}$$

32. If $\sin(A + B) = \cos(A + B)$, what is the value of $\tan A$? 

SSC CGL 02/12/2022 (Shift- 01)

(a) $\frac{1 - \tan B}{1 + \tan B}$

(c) $\frac{1 + \sec B}{1 - \sec B}$

(b) $\frac{1 + \tan B}{1 - \tan B}$

(d) $\frac{1 - \operatorname{cosec} B}{1 + \operatorname{cosec} B}$

$$\tan(A+B) = 1$$

$$\therefore \tan(A+B) = \tan 45^\circ$$

$$\boxed{A = 45^\circ - B}$$

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

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

32. If $\sin(A + B) = \cos(A + B)$, what is the value of $\tan A$? 

SSC CGL 02/12/2022 (Shift- 01)

(a)  $\frac{1 - \tan B}{1 + \tan B}$

(c) $\frac{1 + \sec B}{1 - \sec B}$

(b) $\frac{1 + \tan B}{1 - \tan B}$

(d) $\frac{1 - \operatorname{cosec} B}{1 + \operatorname{cosec} B}$

Transformation of sum or difference into product (योग अथवा अन्तर का गुणन में परिवर्तन)

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

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

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

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

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

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

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

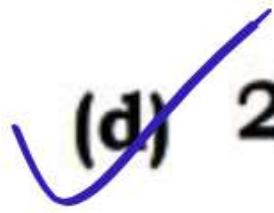
$$* \cos C - \cos D = 2 \sin \frac{(C+D)}{2} \sin \frac{(D-C)}{2}$$

33. If $\sin C + \sin D = x$, then the value of x is :

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

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

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

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

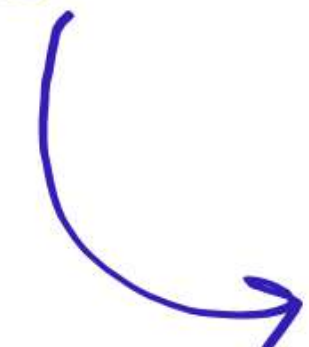
34. What is $\sin\alpha - \sin\beta$?

SSC CGL 01/12/2022 (Shift- 02)

- (a) $2 \cos \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$
- (b) $2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$
- (c) $2 \cos \frac{\alpha - \beta}{2} \sin \frac{\alpha + \beta}{2}$
- (d) $2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$

35. If $\cos C - \cos D = y$, then the value of y is :

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

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


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

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

☒ (c) $-2 \sin \left(\frac{C+D}{2} \right) \sin \left(\frac{C-D}{2} \right)$

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

36. Find the value of: $(\sin 75^\circ + \sin 15^\circ)$.

SSC Phase-XII 21/06/2024 (Shift-03)

☒ (a) $\frac{\sqrt{6}}{2}$

(b) $\sqrt{6}$

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

(d) $\sqrt{3}$

$$\begin{aligned} & \sin 75^\circ + \sin 15^\circ \\ &= 2 \sin 45^\circ \cos 30^\circ \\ &= \cancel{2} \times \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{\cancel{2}} = \frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{6}}{2} \end{aligned}$$

37. Find $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = ?$

(a) $\cot 2x$

(b) $\cot 3x$

✓ (c) $\cot x$

(d) $\cot 6x$

$$= \frac{\cancel{\cos \frac{12x}{2}} \cdot \cos \frac{2x}{2}}{\cancel{\cos \frac{12x}{2}} \sin \frac{2x}{2}} = \cot x$$

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

$$\Rightarrow \boxed{\cos 2x - 1 = -2\sin^2 x}$$

38. Find $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = ?$

- (a) $\tan 4x$
(c) $\tan 2x$

- (b) $\tan 3x$
(d) $\tan x$



$$\frac{\sin 5x + \sin x - 2\sin 3x}{\cos 5x - \cos x}$$

$$= \frac{2\sin 3x \cdot \cos 2x - 2\sin 3x}{2\sin 3x \sin(-2x)} = \frac{\cancel{2\sin 3x} (\cos 2x - 1)}{-\cancel{2\sin 3x} \sin 2x}$$

$$= \frac{+ \cancel{2\sin^2 x}}{+ \cancel{2\sin x} \cos x} = \tan x$$

39.
Master
question

What is the value of

$$\frac{[(\sin x + \sin y)(\sin x - \sin y)]}{[(\cos x + \cos y)(\cos x - \cos y)]} \text{ is :}$$

(a) 0

(b) 1

☒ (c) -1

(d) 2

$$= \frac{2 \sin \frac{(x+y)}{2} \cos \frac{(x-y)}{2} \times 2 \cos \frac{(x+y)}{2} \sin \frac{(x-y)}{2}}{2 \cos \frac{(x+y)}{2} \cos \frac{(x-y)}{2} \times 2 \sin \frac{(x+y)}{2} \sin \frac{(x-y)}{2}} = \frac{1}{-1} = -1$$

40. What is the value of $\sin 75^\circ + \sin 15^\circ$?

(a) $\sqrt{3}$

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

☒ (c) $\sqrt{\frac{3}{2}}$

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

41. Simplify the following:
 $\sin 2x + 2\sin 4x + \sin 6x$

SSC CGL 18/07/2023 (Shift-02)

(a) $4 \cos^2 x \sin 4x$

(b) $4 \cos^2 x \sin x$

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

(d) $4 \sin^2 x \sin 4x$

$$= \sin 6x + \sin 2x + 2\sin 4x$$

$$= 2\sin 4x \cos 2x + 2\sin 4x$$

$$= 2\sin 4x (\cos 2x + 1)$$

$$= 2\sin 4x \times 2\cos^2 x$$

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

Transformation of a product into sum or difference (गुणन का योग या अन्तर में परिवर्तन)

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

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

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

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

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

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

$$* \sin(x+y) = \sin x \cos y + \cos x \sin y \quad \text{--- (i)}$$

$$* \sin(x-y) = \sin x \cos y - \cos x \sin y \quad \text{--- (ii)}$$

$$\text{(i)} + \text{(ii)}$$

$$\sin(x+y) + \sin(x-y) = 2 \sin x \cos y$$

$$\text{(i)} - \text{(ii)}$$

$$\sin(x+y) - \sin(x-y) = 2 \cos x \sin y \quad \times$$

$$\begin{aligned} \text{↶} \quad * \cos(x+y) &= \cos x \cos y - \sin x \sin y & \text{--- (i)} \\ * \cos(x-y) &= \cos x \cos y + \sin x \sin y & \text{--- (ii)} \end{aligned}$$

$$\text{(i)} + \text{(ii)}$$

$$\cos(x+y) + \cos(x-y) = 2 \cos x \cos y$$

$$\text{(ii)} - \text{(i)}$$

$$\cos(x-y) - \cos(x+y) = 2 \sin x \sin y$$

$$* \quad 2 \sin x \cos y = \sin(x+y) + \sin(x-y)$$

$$* \quad 2 \cos x \cos y = \cos(x+y) + \cos(x-y)$$

$$* \quad 2 \sin x \sin y = \cos(x-y) - \cos(x+y)$$

$$\begin{aligned} &= \frac{2 \cos 75^\circ \cos 15^\circ}{2} \\ &= \frac{1}{2} [\cos 90^\circ + \cos 60^\circ] \\ &= \frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \end{aligned}$$

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

SSC CHSL 01/06/2022 (Shift- 02)

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

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

~~(b) $\frac{1}{4}$~~

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

$$= 2 \sin 15^\circ \cos 45^\circ$$

$$= \sin 60^\circ + \sin(-30^\circ)$$

$$= \frac{\sqrt{3}}{2} - \frac{1}{2} = \frac{\sqrt{3}-1}{2}$$

43. What will be value of $2\cos 45^\circ \cdot \sin 15^\circ$

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

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

☒ (c) $\frac{\sqrt{3}-1}{2}$

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

44. Simplify: $\frac{2 \sin 8\theta \cos \theta - 2 \sin 6\theta \cos 3\theta}{2 \cos 2\theta \cos \theta - 2 \sin 3\theta \sin 4\theta}$

SSC CPO 09/11/2022 (Shift-02)

(a) $\cot \theta$

(b) $\cot 2\theta$

(c) $\tan \theta$

(d) $\tan 2\theta$

ans = $\frac{(\cancel{\sin 9\theta} + \sin 7\theta) - (\cancel{\sin 9\theta} + \sin 3\theta)}{(\cos 3\theta + \cancel{\cos 5\theta}) - (\cancel{\cos 5\theta} - \cos 7\theta)}$

= $\frac{\sin 7\theta - \sin 3\theta}{\cos 3\theta + \cos 7\theta} = \frac{\cancel{\cos 5\theta} \sin 2\theta}{\cancel{\cos 5\theta} \cos 2\theta} = \tan 2\theta$

45. Evaluate the following:

$$\cos(36^\circ + A) \cdot \cos(36^\circ - A) + \cos(54^\circ + A) \cdot \cos(54^\circ - A)$$

SSC CGL 14/07/2023 (Shift-2)

(a) $\sin 2A$

(b) $\cos A$

(c) $\sin A$

(d) $\cos 2A$


$$\begin{aligned} &\rightarrow \cos(36+A) \cos(36-A) + \sin(36-A) \sin(36+A) \\ &= \cos\{(36+A) - (36-A)\} \\ &= \cos\{\cancel{36}+A - \cancel{36}+A\} \\ &= \cos 2A \end{aligned}$$

$$A+B=C$$

$$\tan(A+B) = \tan C$$

$$\Rightarrow \frac{\tan A + \tan B}{1 - \tan A \tan B} = \tan C$$

$$\Rightarrow \tan A + \tan B = \tan C - \tan A \tan B \tan C$$

$$\Rightarrow \tan A \tan B \tan C = \tan C - \tan A - \tan B$$

46. If $A + B = C$, then $\tan A \tan B \tan C = ?$

SSC CGL 08/12/2022 (Shift- 01)

- (a) $\tan C + \tan A - \tan B$
- (b) $\tan C + \tan A + \tan B$
- (c) $\tan A - \tan B - \tan C$
- ✓ (d) $\tan C - \tan A - \tan B$

Q. $\tan 10^\circ \tan 20^\circ \tan \underline{\underline{30^\circ}} = ?$

$10 + 20 = 30^\circ$

- (a) $\tan 10^\circ - \tan 20^\circ - \tan 30^\circ$
- (b) $\tan 20^\circ - \tan 10^\circ - \tan 30^\circ$
- (c) $\tan 10^\circ + \tan 20^\circ - \tan 30^\circ$
- ✓ (d) $\tan 30^\circ - \tan 10^\circ - \tan 20^\circ$

47. What is the value of the expression $\cos 2A \cos 2B + \sin^2(A - B) - \sin^2(A + B)$?

SSC CGL 12/12/2022 (Shift- 01)

(a) $\sin (2A - 2B)$

(b) $\sin (2A + 2B)$

☒ (c) $\cos (2A + 2B)$
 $= -1$ $120 + 60$

(d) $\cos (2A - 2B) = \frac{1}{2}$
 60°

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

$A = 60 \quad B = 30$

$= \cos 120^\circ (\cos 60^\circ + \sin^2 30^\circ - \sin^2 90^\circ)$

$= -\frac{1}{2} \times \frac{1}{2} + \frac{1}{4} - 1$

$= -1$

✓ 48. If $\cot 75^\circ = 2 - \sqrt{3}$. Find the value of $\cot 15^\circ$.
Try.

SSC CHSL 24/05/2022 (Shift- 03)

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

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

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

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

Q. $A+B = 45^\circ \text{ or } 225^\circ$

Ans $(1 + \tan A)(1 + \tan B) = 2$
 $(1 - \cot A)(1 - \cot B) = 2$

49. The value of $(1 + \tan 10^\circ)(1 + \tan 35^\circ)$ is:

SSC CHSL 25/05/2022 (Shift- 03)

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

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

(c) 1

 (d) 2

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

$$22.5 + \cancel{x - y} + 22.5 + \cancel{y - x}$$

50. $\left[1 + \tan \left(22\frac{1^\circ}{2} + \cancel{x - y} \right) \right] \left[1 + \tan \left(22\frac{1^\circ}{2} + \cancel{y - x} \right) \right]$

α β

- (a) 0

☒ (c) 2

(b) 1

(d) 4



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

$$= 2$$

51. Find the value of $(1 + \tan 11^\circ)(1 + \tan 21^\circ)(1 + \tan 24^\circ)(1 + \tan 34^\circ)(1 + \tan 45^\circ)$

(a) 0

(b) 1

(c) 2

☒ (d) 8

$$11 + 34 = 45^\circ$$

$$(1 + \tan 11^\circ)(1 + \tan 21^\circ)(1 + \tan 24^\circ)(1 + \tan 34^\circ)(1 + \tan 45^\circ)$$

$$= 2 \times 2 \times 2$$

$$= 8$$

Some Important Results

(कुछ महत्वपूर्ण परिणाम)

$$(i) \sin A \cdot \sin 2A \cdot \sin 4A = \frac{1}{4} \sin 3A$$

$$(ii) \cos A \cdot \cos 2A \cdot \cos 4A = \frac{1}{4} \cos 3A$$

$$(iii) \tan A \cdot \tan 2A \cdot \tan 4A = \tan 3A$$

$$(iv) \sin(60^\circ - A) \cdot \sin A \cdot \sin(60^\circ + A) = \frac{1}{4} \sin 3A$$

$$(v) \cos(60^\circ - A) \cdot \cos A \cdot \cos(60^\circ + A) = \frac{1}{4} \cos 3A$$

$$(vi) \tan(60^\circ - A) \cdot \tan A \cdot \tan(60^\circ + A) = \tan 3A$$

$$(vii) \sin^2(60^\circ - A) + \sin^2 A + \sin^2(60^\circ + A) = \frac{3}{2}$$

$$(viii) \cos^2(60^\circ - A) + \cos^2 A + \cos^2(60^\circ + A) = \frac{3}{2}$$

$$\begin{aligned} * \sin \theta \cdot \sin 2\theta \cdot \sin 4\theta &= \frac{1}{4} \sin 3\theta \\ * \cos \theta \cos 2\theta \cos 4\theta &= \frac{1}{4} \cos 3\theta \\ * \tan \theta \tan 2\theta \tan 4\theta &= \tan 3\theta \end{aligned}$$

$$\begin{aligned} * \sin \theta \cdot \sin (60-\theta) \sin (60+\theta) &= \frac{1}{4} \sin 3\theta \\ * \cos \theta \cos (60-\theta) \cos (60+\theta) &= \frac{1}{4} \cos 3\theta \\ * \tan \theta \tan (60-\theta) \tan (60+\theta) &= \tan 3\theta \end{aligned}$$

52. Find $\sin^{2\theta} 20^\circ \cdot \sin^{2\theta} 40^\circ \cdot \sin^{4\theta} 60^\circ \cdot \sin^{4\theta} 80^\circ$.

(a) $\frac{1}{16}$

(b) $\frac{5}{16}$

✓ (c) $\frac{3}{16}$

(d) $\frac{1}{8}$

$$= \sin 20^\circ \sin 40^\circ \sin 80^\circ \cdot \sin 60^\circ$$

$$= \frac{1}{4} \sin 60^\circ \times \sin 60^\circ$$

$$= \frac{1}{4} \times \frac{3}{4} = \frac{3}{16}$$

53. The value of $(\tan^{20^\circ} \tan^{40^\circ} \tan^{80^\circ})$ is :

(a) 1

(b) 0

☒ (c) $\sqrt{3}$

(d) 3

$$= \tan 60^\circ$$

$$= \sqrt{3}$$

54. Find $1 - \sin_{\theta} 10^{\circ} \cdot \sin_{(60-\theta)} 50^{\circ} \cdot \sin_{(60+\theta)} 70^{\circ}$.

(a) $\frac{5}{8}$

~~(b) $\frac{7}{8}$~~

(c) $\frac{3}{8}$

(d) $\frac{1}{8}$

$= 1 - \frac{1}{4} \sin 30^{\circ}$

$= 1 - \frac{1}{4} \times \frac{1}{2} = 1 - \frac{1}{8} = \frac{7}{8}$

$$\sin 6^\circ \cdot \frac{\sin 54^\circ}{\sin 54^\circ} \cdot \sin 66^\circ \sin 42^\circ \sin 78^\circ \quad 55.$$

$$= \frac{1}{4} \cdot \frac{\sin 18^\circ \cdot \sin 42^\circ \sin 78^\circ}{\sin 54^\circ}$$

$$= \frac{1}{4} \times \frac{1}{\sin 54^\circ} \times \frac{1}{4} \sin 54^\circ = \frac{1}{16}$$

$$\sin 6^\circ \sin 42^\circ \sin 66^\circ \sin 78^\circ = ?$$

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

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

(c) $\frac{1}{8}$

(d) $\frac{1}{16}$

$$\frac{\sin 12^\circ \sin 48^\circ \sin 72^\circ}{\sin 72^\circ} \cdot \sin 54^\circ$$

$$= \frac{1}{4} \cdot \frac{\cancel{\sin 36^\circ} \cdot \sin 54^\circ}{2 \times \cancel{\sin 36^\circ} \times \cos 36^\circ}$$

$$= \frac{1}{8} \times \frac{\cancel{\cos 36^\circ}}{\cancel{\cos 36^\circ}}$$

56. Find $\sin 12^\circ \cdot \sin 48^\circ \cdot \sin 54^\circ$.

(a) $\frac{5}{8}$

(b) $\frac{7}{8}$

(c) $\frac{3}{8}$

(d) $\frac{1}{8}$

57. The value of $(\cos \underline{15^\circ} \cdot \cos \underline{45^\circ} \cdot \cos \underline{75^\circ})$ is :

(a) $\frac{1}{3\sqrt{2}}$

☒ (b) $\frac{1}{4\sqrt{2}}$

(c) $\frac{1}{8}$

(d) $\frac{\sqrt{3}}{8}$

$$= \frac{1}{4} \cos 45^\circ$$

$$= \frac{1}{4} \times \frac{1}{\sqrt{2}}$$

58. $\cos^{10^\circ} \cos^{30^\circ} \cos^{50^\circ} \cos^{70^\circ} = ?$

(Handwritten red annotations: θ above 10° , $60-\theta$ above 50° , $60+\theta$ above 70°)

(a) $\frac{1}{16}$

~~(b) $\frac{3}{16}$~~

(c) $\frac{5}{16}$

(d) $\frac{1}{8}$

$$= \frac{1}{4} \cos 30^\circ \times \cos 30^\circ$$

$$= \frac{1}{4} \times \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \frac{3}{16}$$

$$\frac{\cos 18^\circ}{\cos 18^\circ} \cdot \cos 42^\circ \cos 78^\circ \cos 36^\circ$$

$$= \frac{1}{4} \frac{\cos 54^\circ \cdot \cos 36^\circ}{\cos 18^\circ}$$

$$= \frac{1}{4} \times \frac{2 \times \sin 36^\circ \cos 36^\circ}{\cos 18^\circ}$$

$$= \frac{1}{8} \times \frac{\sin 72^\circ}{\cos 18^\circ}$$

59. $\cos 42^\circ \cdot \cos 78^\circ \cdot \cos 36^\circ = ?$

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

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

(c) $\frac{1}{8}$

(d) $\frac{1}{16}$

60. The value of $\tan 6^\circ$. $\tan 42^\circ$. $\tan 66^\circ$. $\tan 78^\circ$ is :

Try

(a) 1

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

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

(d) $\frac{1}{8}$

Live

→ Trigonometry → Pre + Mains

VOD

→ Maxima & minima →

Live

→ Height & Distance → Mains