**13.** if, $(\sin\theta - \cos\theta)^2 = \left(\frac{2}{5}\right)^2$ then $\sin^3\theta - \cos^3\theta = ?$

$= (S-C)\cdot(1+SC)$

$= \frac{2}{5} \times \frac{71}{50} = \frac{71}{125}$ ✓

a) $\frac{21}{25}$ b) $\frac{29}{25}$ c) $\frac{17}{50}$ d) $\frac{8}{15}$

$1 - 2SC = \frac{4}{25}$

$SC = \frac{21}{50}$

Test RanKING

**27.** If $\frac{\cos\alpha}{\cos\beta} = a, \frac{\sin\alpha}{\sin\beta} = b$, then $\sin^2\beta = ?$

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

**28.** If $\tan\theta = \frac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$, Then $\sin\alpha + \cos\alpha = ?$

(a) $\pm\sqrt{2}\ \sin\theta$ (b) $\pm\sqrt{2}\ \cos\theta$

(c) $\pm\sqrt{2}\ \tan\theta$ (d) $\pm\sqrt{2}\ \cot\theta$

$\sin\alpha - \cos\alpha = k\sin\theta = \pm\sqrt{2}\sin\theta$

$\sin\alpha + \cos\alpha = k\cos\theta = \pm\sqrt{2}\cos\theta$

---

$2 = k^2 \times 1$

$k = \pm\sqrt{2}$

Test RanKING

$a\sin\theta + b\cos\theta = c$

तो $a\cos\theta - b\sin\theta = x$ माना

---

$a^2 + b^2 = c^2 + x^2$ ✓

$x = \pm\sqrt{a^2 + b^2 - c^2}$

$\sin\theta + \cos\theta = k$

$\sin\theta - \cos\theta = \pm\sqrt{2 - k^2}$

**29. If $3\sin x + 4\cos x = 2$, then the value of $3\cos x - 4\sin x$ is equal to:**

**यदि $3\sin x + 4\cos x = 2$ है, तो $3\cos x - 4\sin x$ का मान ज्ञात कीजिए।**

**(a) $\sqrt{21}$ (b) $\sqrt{23}$ (c) 21 (d) $\sqrt{29}$**

$3^2 + 4^2 = 2^2 + ?^2$

$\sqrt{21} = ?$

**30. If $\cos 41^0 + \sin 41^0 = k$, then what is the value of $\cos^3 41^0 - \sin^3 41^0$?**

यदि $\cos 41^0 + \sin 41^0 = k$ है तो $\cos^3 41^0 - \sin^3 41^0$ का मान क्या है?

(a) $\frac{(k^2+1)}{2}\sqrt{2-k^2}$

(b) $\frac{(k^2+1)}{2}\sqrt{k^2-2}$

(c) $\frac{(k^2-1)}{2}\sqrt{2-k^2}$

(d) $\frac{(k^2-1)}{2}\sqrt{k^2-1}$

$(C-S)\cdot(1+CS)$

$\cos 41^\circ > \sin 41^\circ$

$1+2CS=k^2$

$CS=\frac{k^2-1}{2}$

$= \sqrt{2-k^2} \times \left(1+\frac{k^2-1}{2}\right)$

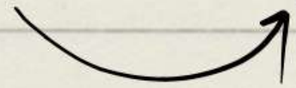
Test RanKING

**31.** If $\sin\theta + \cos\theta = \frac{23}{17}$, Then $\sin\theta - \cos\theta = ?$

(a) $\pm\frac{15}{17}$ (b) $\pm\frac{9}{17}$ (c) $\pm\frac{6}{17}$ (d) $\pm\frac{7}{17}$ $= \pm\frac{7}{17}$

8 15
15 8

$$\frac{P+B}{H} = \frac{23}{17}$$



**32.** If $11\sin\theta + 60\cos\theta = 61; 0 < \theta < 90°$, then what is the value of $\sqrt{660(\tan\theta + \cot\theta)}$?

यदि $11\sin\theta+60\cos\theta=61; 0<\theta<90°$, तो $\sqrt{660(\tan\theta + \cot\theta)}$ का मान क्या है?

A) 61

B) $61\sqrt{2}$

C) 122

D) $122\sqrt{2}$

P B H

$$= \sqrt{660\left(\frac{11}{60} \times \frac{60}{11}\right)}$$

$$= \sqrt{660 \times \frac{61^2}{660}}$$

$$= 61$$

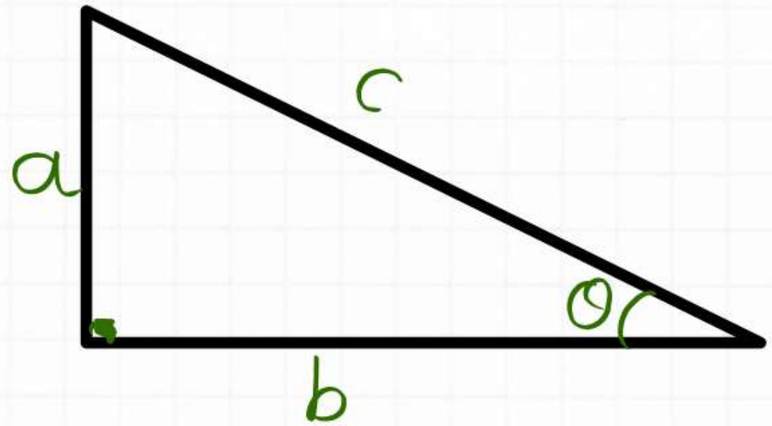
P B H

If, $a\sin\theta + b\cos\theta = c$ and $a^2 + b^2 = c^2$

compare

$\left(\frac{a}{c}\right)\sin\theta + \left(\frac{b}{c}\right)\cos\theta = 1$

$\sin\theta\sin\theta + \cos\theta\cos\theta = 1$




$\sin\theta = \frac{a \to P}{C \to H}$

$\cos\theta = \frac{b \to B}{C \to H}$

P B H

**33.** $(a^2 - b^2)\sin\theta + 2ab\cos\theta = a^2 + b^2$, then $\tan\theta = ?$

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

**34.** If $24\sin^4\alpha + 40\cos^4\alpha = 15$, Then $54\tan^6\alpha + 125\operatorname{cosec}^6\alpha = ?$

(a) 729 (b) 762 (c) 716 (d) 625

$$254 \times \frac{125}{27} + 125 \times \frac{512}{125}$$

$$= 762$$

$$\left(\frac{8}{5}\sin^2\alpha\right)\cdot\sin^2\alpha + \left(\frac{8}{3}\cos^2\alpha\right)\cdot\cos^2\alpha = 1$$

$$\sin^2\alpha = \frac{5}{8} \rightarrow \operatorname{cosec}^2\alpha = \frac{8}{5}$$

$$\cos^2\alpha = \frac{3}{8} \qquad \tan^2\alpha = \frac{5}{3}$$

$$\sin^2\alpha + \cos^2\alpha = \frac{8}{8} = 1$$

Test RanKING

**1. If $sin\theta + cos\theta = 1.25$, then find the value of $tan\theta + cot\theta$?**

यदि $sin\theta + cos\theta = 1.25$ है, तो $tan\theta + cot\theta$ का मान ज्ञात कीजिये?

A) $3\frac{5}{9}$

B) 2.666

C) 0.8

D) $\frac{25}{16}$

$(S+C)^2 = (\frac{5}{4})^2$

$1 + 2SC = \frac{25}{16}$

$SC = \frac{9}{32}$

$= \frac{1}{SC} = \frac{32}{9} = 3\frac{5}{9}$

#

**2. If tan(t) + cot(t) = 16, then one of the values of the expression $\frac{1}{sin(t)+cos(t)}$ is _____ .**

यदि **tan(t) + cot(t) = 16,** तो व्यंजक $\frac{1}{sin(t)+cos(t)}$ का एक मान _____ है।

**[A]** 0.75 $\frac{1}{SC}=16$

**[B]** $\frac{2}{\sqrt{3}}$

**[C]** 6.25 $SC=\frac{1}{16}$

**[D]** $\frac{2\sqrt{2}}{3}$

$(S+C)^2=1+2\times\frac{1}{16}=\frac{9}{8}$

$S+C=\frac{3}{2\sqrt{2}}$

selectionWay

**3. if ,$\tan\theta+\cot\theta = 1.6$ then $(\operatorname{cosec}\theta-\sin\theta)(\sec\theta-\cos\theta)$=?**

$\frac{1}{SC} = \frac{8}{5}$

a) 0.625
b) 1.333
b) c) 0.8
d)0.48

$\left(\frac{1}{S} \to S\right)\left(\frac{1}{C} \to C\right)$

$\frac{C^2}{S} \times \frac{S^2}{C}$

$= CS$

$= \frac{5}{8}$

**4. If $29tan\theta = 31$, then find $\frac{1+sin2\theta}{1-sin2\theta}$?**

**यदि $29tan\theta = 31$ है, तो $\frac{1+sin2\theta}{1-sin2\theta}$ ज्ञात कीजिये?**

**A) 200**

**B) 800**

**C) 700**

**D) 900**

$\frac{S}{C} = \frac{31}{29}$

$= \left(\frac{S+C}{S-C}\right)^2$

$(29)^2$

**5. $1 + 2\cot^2\theta + 2\cos\theta\,\text{cosec}^2\theta$, $0° < \theta < 90°$, is equal to :**

$1 + 2\cot^2\theta + 2\cos\theta\,\text{cosec}^2\theta$ $0° < \theta < 90°$ का मान ज्ञात करें।

(a) $\dfrac{1-\sin\theta}{1+\sin\theta}$

(b) $\dfrac{1+\cos\theta}{1-\cos\theta}$

(c) $\dfrac{1-\cos\theta}{1+\cos\theta}$

(d) $\dfrac{1+\sin\theta}{1-\sin\theta}$

$\text{cosec}^2\theta + \cot^2\theta + 2\cot\theta\,\text{cosec}\theta$

$= (\text{cosec}\theta + \cot\theta)^2$

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

**6. The expression** $\frac{\cos^4\theta-\sin^4\theta+2\sin^2\theta+3}{(\operatorname{cosec}\theta+\cot\theta+1)(\operatorname{cosec}\theta-\cot\theta+1)-2}$, $0°<\theta<90°$ **, is equal to**

व्यंजक $\frac{\cos^4\theta-\sin^4\theta+2\sin^2\theta+3}{(\operatorname{cosec}\theta+\cot\theta+1)(\operatorname{cosec}\theta-\cot\theta+1)-2}$, का मान बताइए, जहां $0°<\theta<90°$ है।

(a) $\frac{1}{2}\sin\theta$ (b) $2\sin\theta$ (c) $\sec\theta$ (d) $2\operatorname{cosec}\theta$

$\text{put } \theta = 45°$

$\frac{4}{(\sqrt{2}+2)\sqrt{2}-2}$

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

$= \sqrt{2}$

$\text{put } \theta = 90°$

$\frac{4}{2}$

$= 2$

**7. If** $\frac{(\cos^6\theta+\sin^6\theta-1)(\tan^2\theta+\cot^2\theta+2)+2}{(\sec\theta+\tan\theta)(\sec\theta-\tan\theta)^2\cos\theta}=\frac{1}{k-1}, 0°<\theta<90°$**, then find k?**

**यदि** $\frac{(\cos^6\theta+\sin^6\theta-1)(\tan^2\theta+\cot^2\theta+2)+2}{(\sec\theta+\tan\theta)(\sec\theta-\tan\theta)^2\cos\theta}=\frac{1}{k-1}, 0°<\theta<90°$ **है, तो k ज्ञात करें?**

**(ICAR Assistant 2022)**

**A)** $\sin\theta$

**B)** $\cos\theta$

**C)** $\sec\theta$

**D)** $\text{cosec}\theta$

$$\frac{-1}{1-S}$$

$$\frac{1}{S-1}=\frac{1}{k-1}$$

8. Simplify: $\frac{(\sin\theta-\cos\theta)(1+\tan\theta+\cot\theta)}{1+\sin\theta\cos\theta}+\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}$

निम्न को सरल कीजिए: $\frac{(\sin\theta-\cos\theta)(1+\tan\theta+\cot\theta)}{1+\sin\theta\cos\theta}+\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}$

(RRB NTPC 12th LEVEL 2025)

A. $\operatorname{cosec}\theta+\sec\theta$
B. $\sin\theta\sec\theta$
C. $\sin\theta+\cos\theta$
D. $\tan\theta+\sec\theta$

**9. Find the value of $\frac{\cos\theta(1+\sin\theta)}{(1+\sin\theta-\cos^2\theta)} \times \frac{(\tan\theta+\cot\theta)^{-1}}{(\operatorname{cosec}\theta-\sin\theta)(\sec\theta-\cos\theta)}$? ? (SSC CGL 2022)**

$\frac{\cos\theta(1+\sin\theta)}{(1+\sin\theta-\cos^2\theta)} \times \frac{(\tan\theta+\cot\theta)^{-1}}{(\operatorname{cosec}\theta-\sin\theta)(\sec\theta-\cos\theta)}$ का मान ज्ञात कीजिये?

**A)** $\cot\theta$

**B)** $\sin^2\theta$

**C)** $\operatorname{cosec}^2\theta$

**D)** $\tan\theta$

**10.** $\frac{(1+\sec\theta\,\mathrm{cosec}\,\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)}{(\sin\theta+\sec\theta)^2+(\cos\theta+\mathrm{cosec}\,\theta)^2}$, $0^0 < \theta < 90^0$, **is equal to:**

$\frac{(1+\sec\theta\,\mathrm{cosec}\,\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)\sec\theta}{(\sin\theta+\sec\theta)^2+(\cos\theta+\mathrm{cosec}\,\theta)^2\sec\theta} = ?$, $0^0 < \theta < 90^0$

**(a)** $1-\cos\theta$ **(b)** $1-\sin\theta$ **(c)** $\cos\theta$ **(d)** $\sin\theta$

$(\sin\theta+\sec\theta)^2+(\cos\theta+\mathrm{cosec}\,\theta)^2$

$= 1+\sec^2\theta\cdot\mathrm{cosec}^2\theta+2\sec\theta\cdot\mathrm{cosec}\,\theta$

$=(1+\sec\theta\cdot\mathrm{cosec}\,\theta)^2$

$= \frac{\sec\theta-\tan\theta}{\sec\theta}$

$=1-S$

$(\sec\theta-\tan\theta)\cdot(\sec\theta+\tan\theta)$

$=1$

**11.** $\left(\frac{\tan^3\theta}{\sec^2\theta}+\frac{\cot^3\theta}{\operatorname{cosec}^2\theta}+2\sin\theta\cos\theta\right)\div(1+\operatorname{cosec}^2\theta+\tan^2\theta),\ 0^0<\theta<90^0$ **is equal to:**

$\left(\frac{\tan^3\theta}{\sec^2\theta}+\frac{\cot^3\theta}{\operatorname{cosec}^2\theta}+2\sin\theta\cos\theta\right)\div(1+\operatorname{cosec}^2\theta+\tan^2\theta)$, $0^0<\theta<90^0$ का मान इनमें से किसके बराबर होगा?

**a)** $\sin\theta\cos\theta$ **(b)** $\operatorname{cosec}\theta$ **(c)** $\sec\theta$ **(d)** $\operatorname{cosec}\theta\sec\theta$

$\frac{S^3}{C}+\frac{C^3}{S}+2SC$

$\sec\theta\cdot\operatorname{cosec}\theta\div(\sec^2\theta\cdot\operatorname{cosec}^2\theta)$

$\frac{S^4+C^4}{SC}+2SC$

$\frac{1-2S^2C^2}{SC}+2SC=\frac{1}{SC}$

**12. Find the value of $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}$?**

$\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}$ का मान ज्ञात कीजिय।

A) $\frac{1+\sin\theta}{\cos\theta}$

B) $\frac{1+\tan\theta}{\cot\theta}$

C) $\frac{1+\cos\theta}{\sin\theta}$

D) $\frac{1+\cot\theta}{\tan\theta}$

$\frac{x-1}{\frac{-1}{x}+1}$

$= \frac{x-1}{\frac{-1+x}{x}} = x = \frac{1+S}{C}$

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

$\downarrow$ $\qquad$ $\downarrow$

$x$ $\qquad$ $\frac{1}{x}$

समान

(VVVV ज्ञात)

**13. Simplify** $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}$.

$\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}$ को हल करें:

put $\theta = 60°$

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

(a) $\cos\frac{\theta}{2}$ ✗

(b) $\sin\frac{\theta}{2}$ ✗

(a) $\tan\frac{\theta}{2}$ ✓ $= \frac{1}{\sqrt{3}}$

(b) $\cot\frac{\theta}{2}$ ✗

**14.** If $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + k$, then k=?

(a) $\cot\theta + \sec\theta$ (b) $\tan\theta + \operatorname{cosec}\theta$

(c) $\tan\theta + \sec\theta$ (d) $\operatorname{cosec}\theta \sec\theta$

$-1 \quad -\sqrt{2}$

$+\sqrt{2} \times -\sqrt{2}$

put $\theta = 135^\circ$

$\tan 135^\circ = \cot 135^\circ = -1$

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

$k = -2$

**15. The value of expression**

$(1 + sec32° + cot58°)(1 - cosec32° + tan58°)$ **is?**

**व्यंजक का मान (1+sec32°+cot58°)(1−cosec32°+tan58°) है?**

**A) 1**
**B) 2**
**C) 4**
**D) 5**

$(1+\sec\theta+\tan\theta)\cdot(1-\operatorname{cosec}\theta+\cot\theta)=2$

$$\frac{(S+C+1)}{C}\times\frac{(S+C-1)}{S}$$

$$=\frac{(S+C)^2-1^2}{C\cdot S}=\frac{1+2SC-1}{C\cdot S}$$

$$=2$$