If A + B = 90° ⟶ A , B are complementary to each other

$\sin A = \cos B \Rightarrow \sin A \cdot \sec B = 1$

$\tan A = \cot B \Rightarrow \tan A \cdot \tan B = 1$ (or) $\cot A \cdot \cot B = 1$

$\sec A = \operatorname{cosec} B \Rightarrow \cos A \cdot \operatorname{cosec} B = 1$

$$\sin^2 A + \sin^2 B = 1$$

$$\cos^2 A + \cos^2 B = 1$$

**217.** If $\sin 5A = \cos(A-42^\circ)$, where 5A is an acute angle, find the value of A.

यदि $\sin 5A = \cos(A-42^\circ)$ है, जहाँ 5A एक न्यूनकोण है, तो A का मान ज्ञात कीजिए।

**RRB NTPC GRADUATE LEVEL CBT-1 2025**

[A] 21°
[B] 22°
[C] 20°
[D] 23°

$\Rightarrow \quad 5A + (A - 42^\circ) = 90^\circ$

$6A = 132^\circ$

$A = 22^\circ$

**218.** If x, y are acute angles, where $0 < x + y < 90°$ and $\sin(3x - 40°) = \cos(3y + 40°)$, then the value of $\tan(x + y)$ is:

यदि x, y न्यून कोण हैं, जहां $0 < x + y < 90°$ और $\sin(3x-40°) = \cos(3y+40°)$ है, तो $\tan(x+y)$ का मान है:

[A] $\frac{1}{\sqrt{2}}$

[B] $\frac{1}{\sqrt{3}}$ ✓

[C] $\sqrt{3}$

[D] $\frac{1}{3}$

$3x+3y=90°$

$x+y=30°$

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

**219.** If $cos(2\theta + 54°) = sin\theta, 0° < (2\theta + 54°) < 90°$, then what is the value of $\frac{1}{tan5\theta + cosec\frac{5\theta}{2}}$?

यदि $cos(2\theta + 54°) = sin\theta$ $0° < (2\theta + 54°) < 90°$ है, तो $\frac{1}{tan5\theta + cosec\frac{5\theta}{2}}$ का मान ज्ञात कीजिए।

**SSC CGL 2020 MAINS**

[A] $2 + \sqrt{3}$
[B] $3\sqrt{2}$
[C] $2\sqrt{3}$
[D] $2 - \sqrt{3}$ ✓

$3\theta + 54° = 90°$

$\theta = 12°$

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

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

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

**220. If $\sin 3\theta . \sec 2\theta = 1$, then what is the value of $[3\tan^2(5\theta/2) - 1]$?**

**यदि $\sin 3\theta . \sec 2\theta = 1$, तो $[3\tan^2(5\theta/2) - 1]$ का मान क्या होगा?**

[A] 0

[B] 3

[C] 1

[D] 2

$5\theta = 90°$

$= 3 - 1$

**221.** If sec 4A = cosec (3A – 50°), where 4A and 3A are acute angles, find the value of cosec (A + 25°)?

यदि sec4A = cosec (3A–50°), जहाँ 4A और 3A न्यून कोण हैं, तो cosec(A + 25°) का मान ज्ञात कीजिए?

RRB ALP 2024

[A] 0

[B] $\frac{1}{\sqrt{2}}$

[C] 1

[D] $\sqrt{2}$

$7A - 50^\circ = 90^\circ$

$A = 20^\circ$

$= \sqrt{2}$

222. If $cosec2\theta = sec(3\theta - 15°)$, then $\theta$ is equal to:

यदि $cosec2\theta = sec(3\theta - 15°)$ है, तो $\theta$ बराबर है

**SSC CHSL TIER – I 2022**

[A] 22°

[B] 20°

[C] 25°

[D] 21°

$5\theta = 105°$

$\theta = 21°$

223. If $\sec(5\alpha-15°) = \operatorname{cosec}(15°-2\alpha)$, then the value of $\cos\alpha + \sin 2\alpha + \tan(1.5\alpha)$ is:

यदि $\sec(5\alpha-15°) = \operatorname{cosec}(15°-2\alpha)$ है, तो $\cos\alpha + \sin 2\alpha + \tan(1.5\alpha)$ का मान ज्ञात करें।

[A] $\sqrt{2}+1$ [B] $\sqrt{2}-1$

[C] $\sqrt{3}-1$ [D] $\sqrt{3}+1$

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

$3\alpha = 90°$

$\alpha = 30°$

224. If cot 3A = tan (A–36°), then what is the value of A?

यदि cot 3A = tan (A–36°), तो A का मान क्या है?

SSC CHSL TIER – I 2022

[A] 33.5 degree

[B] 25 degree

[C] 30 degree

[D] 31.5 degree

$4A - 36° = 90°$

$4A = 126°$

$A = 31.5°$

225. If $\tan x = \cot(48° + 2x)$, and $0° < x < 90°$, then what is the value of x?

यदि $\tan x = \cot(48° + 2x)$, और $0° < x < 90°$ है, तो x का मान ज्ञात करें?

[A] 12°

[B] 14°

[C] 16°

[D] 21°

$3x = 42°$

226. If $\tan(5\theta-10^o)=\cot(5\phi+20^o)$, then the value of $\theta+\phi$ is:

यदि $\tan(5\theta-10^o)=\cot(5\phi+20^o)$ है, तो $\theta+\phi$ का मान क्या है?

SSC CHSL 2023 PRE

[A] 16°

[B] 20°

[C] 18°

[D] 15°

$5\theta+5\phi+10^\circ=90^\circ$

227. $\tan(8\theta-11^\circ).\tan(11\theta-13^\circ)=1$, then find the value of $\sin 10\theta+\cos 5\theta$?

$\tan(8\theta-11^\circ)$ × $\tan(11\theta-13^\circ)$ का मान 1 है, तो $\sin 10\theta+\cos 5\theta$ का मान ज्ञात कीजिए?

[A] $\sqrt{3}$

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

[C] $\frac{\sqrt{3}}{2}$

[D] $\frac{3\sqrt{3}}{4}$

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

$19\theta-24^\circ=90^\circ$

$\theta=6^\circ$

**228.** If $2\sec 2\theta = \tan\varphi + \cot\varphi$, then one of the values of $\theta + \varphi$ =?

यदि $2\sec 2\theta = \tan\varphi + \cot\varphi$, तो $\theta + \varphi$ का एक मान होना चाहिए =?

[A] $\pi/2$ [B] $\pi/4$

[C] $\pi/3$ [D] $\pi/6$

$$2\sec 2\theta = 2\operatorname{cosec} 2\phi$$

$$\Rightarrow \sec 2\theta = \operatorname{cosec} 2\phi$$

$$2\theta + 2\phi = 90^\circ$$

$$\theta + \phi = 45^\circ$$

**229.** **ΔPQR is a right angled triangle. ∠Q = 90 degree, PQ = 12 cm, QR = 5cm. What is the value of cotP – tanR?**

**ΔPQR एक समकोण त्रिभुज है। ∠Q = 90 डिग्री, PQ = 12 cm, QR = 5 cm है। cotP – tanR का मान क्या है?**

**SSC CHSL TIER – I, 2022. RRB NTPC GRADUATE LEVEL CBT-1 2025**

[A] 5/24 [B] 5/6

[C] 5/13 [D] 0

$\Rightarrow P+R=90^\circ$

**230.** If A, B and C be the angles of a triangle, then out of the following, the incorrect relation is:

यदि A, B और C एक त्रिभुज के कोण हैं, तो निम्नलिखित में से गलत संबंध है:

**SSC CGL 2020 PRE**

[A] $\cos\frac{A+B}{2} = \sin\frac{C}{2}$ ✓

[B] $\tan\frac{A+B}{2} = \sec\frac{C}{2}$ ✗

[C] $\cot\frac{A+B}{2} = \tan\frac{C}{2}$ ✓

[D] $\sin\frac{A+B}{2} = \cos\frac{C}{2}$ ✓

$$\frac{A+B}{2} + \frac{C}{2} = 90^\circ$$

**231.** **Triangle ABC is a right-angle triangle at B. If $tanA = \frac{5}{12}$, then sinA + sinB + sinC will be equal to?**

**त्रिभुज ABC, B पर एक समकोण त्रिभुज है। यदि $tanA = \frac{5}{12}$, तो sinA + sinB + sinC किसके बराबर होगा?**

**SSC CGL 2024 PRE**

[A] $2\frac{1}{13}$

[B] $1\frac{5}{13}$

[C] $3\frac{1}{13}$

[D] $2\frac{4}{13}$

P → P, B → B, 13 → H

GSA

$\angle B = 90^\circ$

$\Rightarrow A + C = 90^\circ$

$= \frac{5}{13} + 1 + \frac{12}{13}$

$= 1 + \frac{17}{13}$

$= 1 + 1\frac{4}{13}$

$= 2\frac{4}{13}$

**232.** If A, B and C are in the interior angles of $\Delta ABC$, then what is the value of $\{\tan\frac{A}{2}+\operatorname{cosec}\frac{B+C}{2}\}\{\tan\frac{A}{2}-\operatorname{cosec}\frac{B+C}{2}\}$?

यदि A, B और C, $\Delta ABC$ के आंतरिक कोण हैं, तो $\{\tan\frac{A}{2}+\operatorname{cosec}\frac{B+C}{2}\}\{\tan\frac{A}{2}-\operatorname{cosec}\frac{B+C}{2}\}$ का मान क्या है?

**SSC CPO 2024**

[A] 2
[B] −1
[C] −2
[D] 1

$$= \tan^2\frac{A}{2} - \operatorname{cosec}^2\frac{B+C}{2}$$

$$\left(\frac{A}{2}\right)+\left(\frac{B+C}{2}\right)= 90^\circ$$

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

$$= -1$$

**233.** In ΔABC, right angled at B, if $tan = \frac{1}{2}$, then the value of $\frac{sinA(cosC+cosA)}{cosC(sinC-sinA)}$ is:

ΔABC में, जो B पर समकोण है, यदि $tanA = \frac{1}{2}$ है, तो $\frac{sinA(cosC+cosA)}{cosC(sinC-sinA)}$ का मान ज्ञात कीजिए।

**SSC CGL MAINS 2021**

[A] $2\sqrt{5}$ [B] (3)

[C] 2 [D] 1

$\Rightarrow A+C=90^\circ$

$\Rightarrow \frac{\sin A}{\cos A} = \frac{1}{2}$

$= \frac{\sin A + \cos A}{\cos A - \sin A}$

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

$= 3$

**234.** In $\Delta PQR$, $\angle Q = 90$. If $\tan R = \frac{1}{3}$, then what is the value of $\frac{secP(cosR+sinP)}{cosecR(sinR-cosecP)}$?

$\Delta PQR$ में, $\angle Q = 90^\circ$ है। यदि $\tan R = \frac{1}{3}$ है, तो $\frac{secP(cosR+sinP)}{cosecR(sinR-cosecP)}$ का मान ज्ञात करें।

[A] $-\frac{2}{7}$

[B] $\frac{18}{7}$

[C] $\frac{2}{7}$

[D] $-\frac{18}{7}$

$\frac{\cos R+\cos R}{\sin R-\sec R}$

$P+R=90^\circ$

$= \frac{2\cos R}{\sin R-\sec R}$

$\tan R = \frac{1}{3} \rightarrow P, B$

$\sqrt{10} \rightarrow H$

$= \frac{2\times\frac{3}{\sqrt{10}}}{\frac{1}{\sqrt{10}}-\frac{\sqrt{10}}{3}} = \frac{\frac{6}{\sqrt{10}}}{\frac{-7}{3\sqrt{10}}} = \frac{6}{\sqrt{10}}\times\frac{3\sqrt{10}}{-7}$

$= -\frac{18}{7}$

**235. For what relation between a and b is the equation $\sin\theta = \frac{a+b}{2\sqrt{ab}}$ possible?**

**a और b के बीच किस संबंध के लिए समीकरण $\sin\theta = \frac{a+b}{2\sqrt{ab}}$ संभव है?**

**(CDS 2023)**

**[a] a = b** ✓

**[b] a > b**

**[c] $a \leq b$**

**[d] $a \geq b$**

$-1 \leq \sin\theta, \cos\theta \leq +1$

$-\infty \leq \tan\theta, \cot\theta \leq +\infty$

$(-5)^2 = (+5)^2 = 25$

$\sin^2\theta \leq 1$

$\frac{(a+b)^2}{4ab} \leq 1$

$(a+b)^2 \leq 4ab$

$(a+b)^2 - 4ab \leq 0$

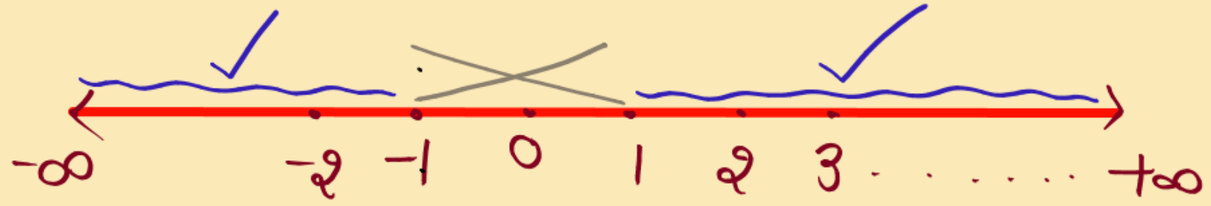
$(a-b)^2 \leq 0$

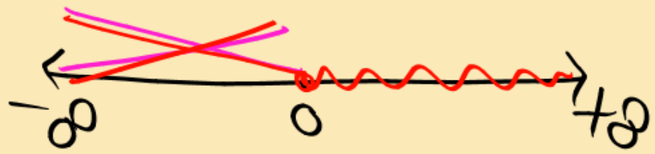
$\Rightarrow (a-b)^2 = 0 \Rightarrow a-b=0 \Rightarrow a=b$

$-1 \leq \sin\theta, \cos\theta \leq +1 \implies 0 \leq \sin^2\theta, \cos^2\theta \leq 1$

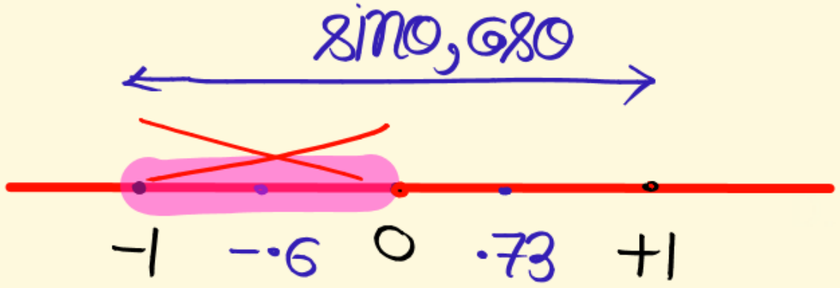
$-\infty \leq \tan\theta, \cot\theta \leq +\infty \qquad 0 \leq \tan^2\theta, \cot^2\theta \leq +\infty$

$-\infty \leq \sec\theta, \operatorname{cosec}\theta \leq +\infty$ but $-1$ से $+1$ के बीच नहीं होता




$1 \leq \sec^2\theta, \operatorname{cosec}^2\theta \leq +\infty$




$(-ve)^2 = (+ve)^2 = +ve$

$0 \leq \sin^2\theta \leq 1$

$\sin\theta = -.6$
$\sin^2\theta = .36$

$\sin\theta = .8$
$\sin^2\theta = .64$

# Sheet-2

70's

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

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

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

SelectionWay

1. If $m = a\cos^3\beta$ and $n = b\sin^3\beta$, then find the value of $\left\{\frac{m}{a}\right\}^{\frac{2}{3}} + \left\{\frac{n}{b}\right\}^{\frac{2}{3}}$.

यदि $m = a\cos^3\beta$ और $n = b\sin^3\beta$ है, तो $\left\{\frac{m}{a}\right\}^{\frac{2}{3}} + \left\{\frac{n}{b}\right\}^{\frac{2}{3}}$ का मान ज्ञात कीजिए।

[A] 3
[B] 0
[C] 1
[D] 2

$(\cos^3\beta)^{\frac{2}{3}} + (\sin^3\beta)^{\frac{2}{3}}$

$(a^m)^n = a^{m\times n}$

$= \cos^2\beta + \sin^2\beta$

$= 1$

#

यदि $x = a\sin\theta + b\cos\theta$

याद करो

$$y = a\cos\theta - b\sin\theta$$

Square and add

$$x^2 + y^2 = (a\sin\theta + b\cos\theta)^2 + (a\cos\theta - b\sin\theta)^2$$

$$= a^2\sin^2\theta + b^2\cos^2\theta + 2ab\sin\theta\cos\theta + a^2\cos^2\theta + b^2\sin^2\theta - 2ab\cos\theta\sin\theta$$

$$\boxed{x^2 + y^2 = a^2 + b^2}$$



3. If $x = asin\theta - bcos\theta, y = acos\theta + bsin\theta$, then which of the following is true?

यदि $x = asin\theta - bcos\theta$ और $y = acos\theta + bsin\theta$ है, तो निम्नलिखित में से कौन सा कथन सत्य है?

[A] $\frac{x^2}{y^2} + \frac{a^2}{b^2} = 1$

[B] $x^2+y^2=a^2- b^2$

[C] $x^2+y^2=a^2+b^2$

[D] $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

4. If x = 4cosA + 5sinA and y = 4sinA - 5cosA, then the value of $x^2 + y^2$ *is*: –

यदि x = 4cosA + 5sinA और y = 4sinA - 5cosA हो, तो $x^2 + y^2$ का मान ज्ञात कीजिए

[A] 25
[B] 16
[C] 0
[D] 41

$= 4^2+5^2$

5. If $x = 7\sin A + 24\cos A$ and $y = 7\cos A - 24\sin A$, then what is the value of $3(x^2 + y^2)$ ?
यदि $x = 7\sin A + 24\cos A$ और $y = 7\cos A - 24\sin A$ है, तो $3(x^2 + y^2)$ का मान क्या है?

[A] 1760
[B] 2120
[C] 1875
[D] 1290

$= 3 \times 625$

$x^2 + y^2 = 7^2 + 24^2$

$= 625$

6. If $x\cos A - y\sin A = 1$ and $x\sin A + y\cos A = 4$, then the value of $17x^2 + 17y^2$ is:

यदि $x\cos A - y\sin A = 1$ and $x\sin A + y\cos A = 4$ है, तो $17x^2 + 17y^2$ का मान क्या है?

[A] 7

[B] 49

[C] 0

[D] 289

$= 17 \times (x^2 + y^2)$

$= 17 \times 17$

$x^2 + y^2 = 1^2 + 4^2$

$= 17$

2. If $x = 8(sin\theta + cos\theta) \& y = 9(sin\theta - cos\theta)$, then find the value of $\frac{x^2}{8^2} + \frac{y^2}{9^2}$?

यदि $x = 8(sin\theta + cos\theta) \& y = 9(sin\theta - cos\theta)$ है, तो $\frac{x^2}{8^2} + \frac{y^2}{9^2}$ का मान ज्ञात करें?

[A] 4
[B] 6
[C] 8
[D] 2

$\left(\frac{x}{8}\right)^2 + \left(\frac{y}{9}\right)^2$

$= (S+C)^2 + (S-C)^2$

$= 2X(S^2+C^2)$

$= 2$

7. If $6x = \sin\theta$ and $\frac{6}{x} = \cos\theta$, then the value of $8\left(x^2 + \frac{1}{x^2}\right)$ is:

यदि $6x = \sin\theta$ और $\frac{6}{x} = \cos\theta$ है, तो $8\cdot\left(x^2 + \frac{1}{x^2}\right)$ का मान ज्ञात करें।

[A] 2

[B] $\frac{2}{9}$

[C] 4

[D] 1

$36x^2 + \frac{36}{x^2} = 1$

$8x\left(x^2 + \frac{1}{x^2}\right) = \frac{1\cancel{8}}{\cancel{36}} = \frac{2}{9}$