RPF SI & CONSTABLE 2024

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MATHS

Trigonometry

Part -4



LIVE STREAMING 24-10-2024 11:00AM

Trignometric Identities

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

$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

$$1 + \tan^2\theta = \sec^2\theta$$

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

$$(1 + \cot^2\theta = \operatorname{cosec}^2\theta)$$

$$(\cot^2\theta = \operatorname{cosec}^2 - 1)$$

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

$$\tan^2\theta + 1 = \sec^2\theta$$

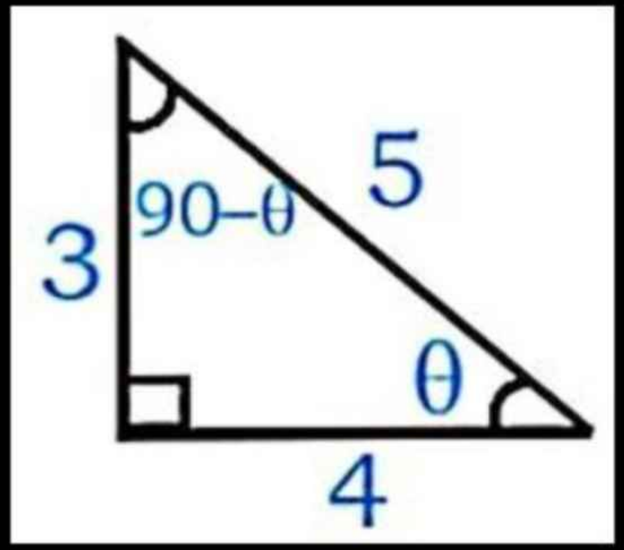
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Trigonometry Ratio Table (द्रिकोणमिति अनुपात तालिका)

Angle (In Degrees)	0°	30°	45°	60°	90°	180°	270°	360°
Angle (In Radians)	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0	1
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not Defined	0	Not Defined	0
cot	Not Defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	Not Defined	0	Not Defined
sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not Defined	-1	Not Defined	1
cosec	Not Defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	Not Defined	-1	Not Defined

Change of T-Ratio / त्रिकोणमिति-अनुपात का परिवर्तन $90°, 270°$ ... ($90°$ के odd multiple पर change) $180°, 360°$ .... no change ($90°$ के even multiple पर no change)

$\sin \leftrightarrow \cos, \tan \leftrightarrow \cot, \sec \leftrightarrow \operatorname{cosec}$



$$\sin(90° - \theta) = \frac{4}{5} = \cos\theta$$

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

$$\tan(90^\circ - \theta) = \cot\theta$$

$$\cot(90^\circ - \theta) = \tan\theta$$

$$\sec(90^\circ - \theta) = \operatorname{cosec}\theta$$

$$\operatorname{cosec}(90^\circ - \theta) = \sec\theta$$

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

$$\text{Cos}(90^\circ + \theta) = -\sin\theta$$

$$\text{Tan}(90^\circ + \theta) = -\cot\theta$$

$$\text{Cot}(90^\circ + \theta) = -\tan\theta$$

$$\text{Sec}(90^\circ + \theta) = -\text{cosec}\,\theta$$

$$\text{Cosec}(90^\circ + \theta) = \sec\theta$$

Formula form - (A + B)

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

$$\sin 18^\circ = \frac{\sqrt{5}-1}{4} \quad \cos 18^\circ = \frac{\sqrt{10+2\sqrt{5}}}{4}$$

$$\cos 36^\circ = \frac{\sqrt{5}+1}{4} \quad \sin 36^\circ = \frac{\sqrt{10-2\sqrt{5}}}{4}$$

$$\sin 75^\circ = \cos 15^\circ = \frac{\sqrt{3}+1}{2\sqrt{2}}$$

$$\sin 15^\circ = \cos 75^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

$$\therefore \text{Tan } 75^\circ = \cot 15^\circ = \frac{\sqrt{3}+1}{\sqrt{3}-1} = 2+\sqrt{3}$$

$$\therefore \text{Tan } 15^\circ = \cot 75^\circ = \frac{\sqrt{3}-1}{\sqrt{3}+1} = 2-\sqrt{3}$$

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1. If $\tan A = \frac{4}{3}, 0 \leq A \leq 90°$, then find the value of $\sin A$.

   यदि $\tan A = \frac{4}{3}, 0 \leq A \leq 90°$, है, तो $\sin A$ का मान क्या होगा?

   (a) $\frac{4}{5}$

   (b) $\frac{3}{5}$

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

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

2. If $\sin\theta = \left(\frac{9}{41}\right), 0° < \theta < 90°$ then what is the value of $\cot\theta$?

यदि $\sin\theta = \left(\frac{9}{41}\right), 0° < \theta < 90°$ तो $\cot\theta$ का मान क्या होगा?

(a) $\frac{40}{9}$

(b) $\frac{35}{8}$

(c) $\frac{39}{9}$

(d) $\frac{47}{8}$

3. If $\tan A = \frac{2}{5}$ find the value of $\frac{\sec^2 A}{\text{cosec}^2 A}$.

यदि $\tan A = \frac{2}{5}$ है, तो $\frac{\sec^2 A}{\text{cosec}^2 A}$ का मान ज्ञात कीजिए।

(a) $\frac{3}{5}$

(b) $\frac{4}{25}$

(c) $\frac{2}{5}$

(d) $\frac{9}{25}$

4. If $\sin \beta = \frac{1}{3}, (\sec \beta - \tan \beta)^2$ is equal to:

यदि $\sin \beta = \frac{1}{3}$ है, तो $(\sec \beta - \tan \beta)^2$ किसके बराबर है?

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

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

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

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

5. If $\cos\theta = \frac{\sqrt{3}}{2}$, then $\tan^2\theta\cos^2\theta = ?$

यदि $\cos\theta = \frac{\sqrt{3}}{2}$ है, तो $\tan^2\theta\cos^2\theta = ?$

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

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

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

(d) $\sqrt{3}$

6. If $5\sin\theta - 4\cos\theta = 0, 0° < \theta < 90°$, then the value of $\frac{5\sin\theta+2\cos\theta}{5\sin\theta+3\cos\theta}$ is:

यदि $5\sin\theta - 4\cos\theta = 0, 0° < \theta < 90°$ है तो $\frac{5\sin\theta+2\cos\theta}{5\sin\theta+3\cos\theta}$ का मान ज्ञात कीजिए।

(a) $\frac{4}{7}$

(b) $\frac{6}{7}$

(c) $\frac{2}{7}$

(d) $\frac{3}{7}$

7. $\tan\theta = \frac{3}{4}$, find the value of expression $\frac{1+\sin\theta}{1-\sin\theta}$:

यदि $\tan\theta = \frac{3}{4}$ अभिव्यक्ति $\frac{1+\sin\theta}{1-\sin\theta}$ का मान ज्ञात कीजिए:

(a) 4

(b) 3

(c) 8

(d) 5

8. Evaluate the follwing:/निम्नलिखित का मूल्यांकन करें:

$$\sin 60^\circ + \tan 30^\circ + \cos 45^\circ$$

(a) $\frac{5\sqrt{2}+3\sqrt{3}}{4}$

(b) $\frac{3\sqrt{2}+5\sqrt{3}}{4}$

(c) $\frac{5\sqrt{2}+3\sqrt{3}}{6}$

(d) $\frac{3\sqrt{2}+5\sqrt{3}}{6}$

9. **What is the value of** $\sin 30^\circ + \cos 30^\circ + \tan 30^\circ$

$\sin 30^\circ + \cos 30^\circ + \tan 30^\circ$ **का मान क्या है?**

(a) $\frac{5+\sqrt{3}}{2\sqrt{3}}$

(b) $\frac{5-\sqrt{3}}{2\sqrt{3}}$

(c) $\frac{5+\sqrt{3}}{\sqrt{3}}$

(d) $\frac{5-\sqrt{3}}{\sqrt{3}}$

10. Find the value of the given expression.

दिए गए व्यंजक का मान ज्ञात करें।

$$\frac{4}{3}\tan^2 45^\circ + 3\cos^2 30^\circ - 2\sec^2 30^\circ - \frac{3}{4}\cot^2 60^\circ$$

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

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

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

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

11. **Find the exact value of** $\cos 120°$.

$\cos 120°$ **का सटीक मान ज्ञात कीजिए।**

(a) -0.5

(b) 0

(c) 0.5

(d) 1

12. Find the value of the following?

$\cos^2(270-\phi) - \sin^2(180-\phi) + \sin^2\left(\frac{\pi}{2}\right)\sin^2(270-\phi)$.

निम्न का मान ज्ञात कीजिए?

(a) $\cos^2\phi$

(b) $\sin^2\left(\frac{\pi}{2}\right)$

(c) $-\sin^2(\phi) - 1$

(d) $\sin^2(\phi)$



$\pi = 180^\circ$

$\frac{\pi}{2} = 90^\circ$

$\cos^2(270-\theta) - \sin^2(180-\theta) + \sin^2(90).\sin^2(270-\theta)$

$-\sin^2\theta - \sin^2\theta + 1\,(-\cos^2\theta)$

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

$= -\sin^2\theta - (\sin^2\theta + \cos^2\theta)$

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

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

13. What is the value of $[\cos(90° + A) + \sec(270° - A)] + [\sin(270° + A) + \operatorname{cosec}(630° - A)]$ का मान ज्ञात कीजिए।

(a) $3 \sec A$

(b) $\tan A \sec A$

(c) 0

(d) 1

90×7

$[\cos(90+A) + \sec(270-A)] + [\sin(270+A) + \operatorname{cosec}(630-A)]$

$-\sin A \quad -\operatorname{cosec} A \quad -\cos A \quad -\sec A$

90 × odd → Ratio Change

90 × Even → No change



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13. What is the value of $[\cos(90° + A) + \sec(270° - A)] + [\sin(270° + A) + \operatorname{cosec}(630° - A)]$ का मान ज्ञात कीजिए।

(a) $3 \sec A$

(b) $\tan A \operatorname{sec} A$

(c) 0

(d) 1

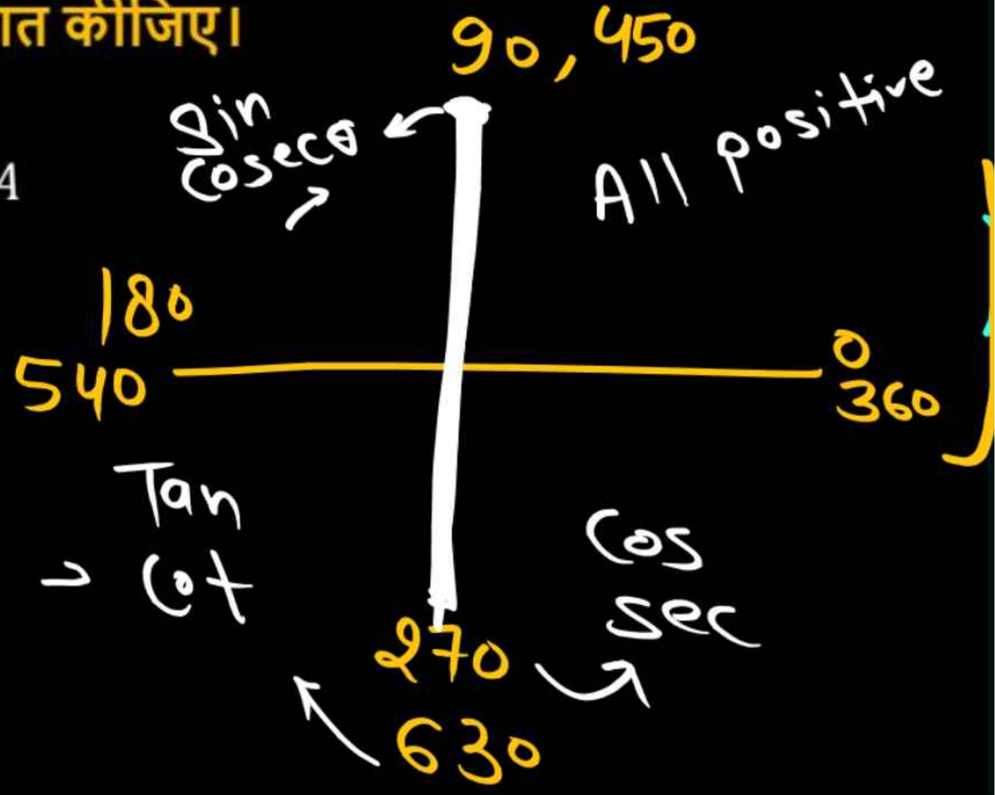
$$[\cos(90+A) + \sec(270-A)] + [\sin(270+A) + \operatorname{cosec}(630-A)]$$

$$[-\sin A - \operatorname{cosec} A] + [-\cos A - \sec A]$$

$$-\sin A - \operatorname{cosec} A - \cos A - \sec A$$

$$-\left(\sin A + \frac{1}{\sin A}\right) - \left(\cos A + \frac{1}{\cos A}\right)$$

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



14. What is the value of $\sin(-405^\circ)$?

$\sin(-405^\circ)$ का मान ज्ञात करें।

(a) $\frac{\sqrt{5}}{2}$

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

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

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

15. **Find the value of** $\tan(-1125^\circ)$.

$\tan(-1125^\circ)$ **का मान ज्ञात कीजिए।**

(a) 1

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

(c) -1

(d) 0

16. Find the value of $\tan 4384^\circ + \cot 6814^\circ = ?$

$\tan 4384^\circ + \cot 6814^\circ$ **का मान ज्ञात कीजिए।**

(a) -1

(b) 2

(c) 0

(d) 1

7

$360 \times 12 \Rightarrow 4320$

360×20

7200

6814

386

19×360

$\Rightarrow 6840$

6814

26

$\tan(12 \times 360 + 64) + \cot(19 \times 360 - 26)$

$\tan 64 - \cot 26$

$\tan 64 - \cot(90 - 64)$

$\tan 64 - \tan 64$

$\rightarrow 0$