

Trigonometric Identities Worksheet

Introduction to Identities

1. If $\sin \theta = \frac{3}{5}$, then $\csc \theta = ?$

2. If $\cos \theta = -\frac{\sqrt{3}}{2}$, then $\sec \theta = ?$

3. If $\tan \theta = 2$, then $\cot \theta = ?$

4. If $\sec \theta = 1$, then $\cos \theta = ?$

5. If $\sin \theta = -\frac{3}{5}$ and $\cos \theta = \frac{4}{5}$, find $\tan \theta$ and $\cot \theta$.

6. If $\sin \theta = \frac{3}{5}$ and θ terminates in quadrant II, find $\cos \theta$.

7. Write $\sec \theta \tan \theta$ in terms of $\sin \theta$ and $\cos \theta$ and then simplify.

8. Add $\frac{1}{\sin \theta} + \frac{1}{\cos \theta}$.

9. Multiply $(\sin \theta + 2)(\sin \theta - 5)$.

Proving Identities

1. Prove $\sin \theta \cot \theta = \cos \theta$.
2. Prove $\tan x + \cos x = \sin x(\sec x + \cot x)$.
3. Prove $1 + \cos \theta = \frac{\sin^2 \theta}{1 - \cos \theta}$.
4. Prove $\tan x + \cot x = \sec x \csc x$.

Sum and Difference Formulas

1. Find the exact value for $\cos 75^\circ$.
2. Show that $\cos(x + 2\pi) = \cos x$.
3. Write $\cos 3x \cos 2x - \sin 3x \sin 2x$ as a single cosine.
4. If $\sin A = \frac{3}{5}$ with A in QI and $\cos B = -\frac{5}{13}$ with B in QIII, find
 - (a) $\sin(A + B)$
 - (b) $\cos(A + B)$
 - (c) $\tan(A + B)$

Double-Angle and Half-Angle Formulas

1. If $\sin A = \frac{3}{5}$ with A in QII, find $\sin 2A$.

2. Prove $(\sin \theta + \cos \theta)^2 = 1 + \sin 2\theta$.

3. If $\sin A = \frac{1}{\sqrt{5}}$, find $\cos 2A$.

4. If $\sin A = -\frac{12}{13}$ and $180^\circ < A < 270^\circ$, find

(a) $\sin\left(\frac{A}{2}\right)$

(b) $\cos\left(\frac{A}{2}\right)$

(c) $\tan\left(\frac{A}{2}\right)$

Trigonometric Equations

1. Find all values of x for which $2\cos x - \sqrt{3} = 0$, if $0^\circ \leq x < 360^\circ$.

2. Solve $2\sin \theta - 3 = 0$, if $0^\circ \leq x < 360^\circ$.

3. Solve $2\cos^2 t - 9\cos t = 5$, if $0 \leq t < 2\pi$.

4. Solve $2\sin^2 \theta + 2\sin \theta - 1 = 0$, if $0^\circ \leq \theta < 2\pi$.

5. Solve $\cos 2\theta + 3\sin \theta - 2 = 0$, if $0^\circ \leq \theta \leq 360^\circ$.