

Trigonometric Identities

Chapter 21: Trigonometric Identities · Topic 1

Key Concept

The fundamental identity $\sin^2\theta + \cos^2\theta = 1$ relates sine and cosine, derived from the Pythagorean theorem applied to a right triangle.

Other identities include $1 + \tan^2\theta = \sec^2\theta$ and $1 + \cot^2\theta = \operatorname{cosec}^2\theta$, derived from the fundamental identity.

These identities help simplify complex trigonometric expressions and solve trigonometric equations more efficiently.

Understanding and applying trigonometric identities is essential for advanced trigonometry problems and proving trigonometric relationships.

Quick Revision Notes

- Fundamental identity: $\sin^2\theta + \cos^2\theta = 1$.
- This comes from the Pythagorean theorem.
- $1 + \tan^2\theta = \sec^2\theta$.
- $1 + \cot^2\theta = \operatorname{cosec}^2\theta$.
- These derive from the fundamental identity.
- Identities simplify complex expressions.
- They help solve trigonometric equations.
- They're essential for advanced trigonometry.

Practice Questions

- 1 Verify $\sin^2\theta + \cos^2\theta = 1$ for $\theta=30^\circ$.
- 2 Simplify an expression using a trigonometric identity.
- 3 Use $1+\tan^2\theta=\sec^2\theta$ to find $\sec \theta$ given $\tan \theta$.
- 4 Solve a trigonometric equation using identities.
- 5 Discuss why identities are useful in trigonometry.
- 6 Prove a simple trigonometric identity.