Trigonometric Identities Quiz Answer Key PDF

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Which of the following is a double angle identity for cosine?

A. $\cos(2\theta) = 2\cos^2\theta - 1$ ✓

B. $\cos(2\theta) = \sin^2\theta - \cos^2\theta$

C. $\cos(2\theta) = 1 - \sin^2\theta$

D. $\cos(2\theta) = 2\sin\theta \cos\theta$

Which identity is used to express tan(2θ)?

A. $2\tan\theta / (1 - \tan^2\theta)$ ✓

B. $\tan^2\theta + 1$

C. $\sin(2\theta) \cdot \cos(2\theta)$

D. $\tan\theta / (1 + \tan^2\theta)$

What is the value of sin(90° - θ)?

A. $\sin\theta$

B. $\cos\theta$ ✓

C. $\tan\theta$

D. $\csc\theta$

Which of the following is the Pythagorean identity?

A. $\sin^2\theta + \cos^2\theta = 1$ ✓

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

C. $\sin\theta \cdot \cos\theta = 1$

D. $\tan\theta \cdot \cot\theta = 1$

Which of the following are valid angle sum identities?

A. sin(α + β) = sin α cos β + cos α sin β ✓
B. cos(α + β) = cos α cos β - sin α sin β ✓
C. tan(α + β) = (tan α + tan β) / (1 - tan α tan β ✓
D. sin(α + β) = sin α sin β + cos α cos β

Identify the half-angle identities for sine and cosine.

A. $\sin^2(\theta/2) = (1 - \cos \theta)/2$ ✓
B. $\cos^2(\theta/2) = (1 + \cos \theta)/2$ ✓
C. $\sin^2(\theta/2) = (1 + \cos \theta)/2$
D. $\cos^2(\theta/2) = (1 - \cos \theta)/2$

Select the correct double angle identities for sine and cosine.

A. sin(2θ) = 2sin θ cos θ ✓
B. $\cos(2\theta) = \cos^2\theta - \sin^2\theta$ ✓
C. $\sin(2\theta) = \sin^2\theta + \cos^2\theta$
D. $\cos(2\theta) = 1 - 2\sin^2\theta$ ✓

Provide a real-world application of trigonometric identities and explain how they are used in that context.

In signal processing, trigonometric identities are used to break down complex signals into simpler sine and cosine components, allowing engineers to analyze and manipulate signals more effectively.

Explain how the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$ can be used to derive other trigonometric identities.

By rearranging the Pythagorean identity, we can derive $\sin^2\theta = 1 - \cos^2\theta$ and $\cos^2\theta = 1 - \sin^2\theta$. Additionally, dividing the entire identity by $\cos^2\theta$ gives us the identity $\tan^2\theta + 1 = \sec^2\theta$, and dividing by $\sin^2\theta$ yields $1 + \cot^2\theta = \csc^2\theta$.

Explain the relationship between product-to-sum identities and sum-to-product identities, and how they can be used to simplify trigonometric expressions.

The product-to-sum identities and sum-to-product identities are inverse operations that allow for the transformation of trigonometric expressions, facilitating simplification and calculation.

Describe the process of using angle sum identities to simplify trigonometric expressions. Provide an example.

To simplify a trigonometric expression using angle sum identities, identify the angles involved, apply the appropriate identity (such as sin(a ± b) = sin(a)cos(b) ± cos(a)sin(b) or cos(a ± b) = cos(a)cos(b) ∓ sin(a)sin(b)), and then simplify the resulting expression. For example, to simplify sin(30° + 45°), we use the identity: sin(30° + 45°) = sin(30°)cos(45°) + cos(30°)sin(45°) = (1/2)(√2/2) + (√3/2)(√2/2) = (√2/4) + (√6/4) = (√2 + √6)/4.

Which identity represents the cosine of a sum of two angles?

A. cos(α + β) = cos α cos β - sin α sin β ✓
B. cos(α + β) = sin α cos β + cos α sin β
C. cos(α + β) = tan α + tan β
D. cos(α + β) = sec α sec β

Which of the following are Pythagorean identities?

A. $\sin^2\theta + \cos^2\theta = 1$ ✓
B. $1 + \tan^2\theta = \sec^2\theta$ ✓
C. sin θ + cos θ = 1
D. $1 + \cot^2\theta = \csc^2\theta$ ✓

What is the co-function identity for tan(π/2 - θ)?

A. sin θ
B. cos θ
C. cot θ ✓
D. sec θ

What is the reciprocal of the sine function?

A. Secant
B. Cosecant ✓
C. tangent
D. Cotangent

Which of the following are co-function identities?

A. $\sin(\pi/2 - \theta) = \cos \theta$ ✓
B. $\cos(\pi/2 - \theta) = \sin \theta$ ✓
C. $\tan(\pi/2 - \theta) = \sec \theta$
D. $\csc(\pi/2 - \theta) = \sec \theta$

Select the identities that can be derived from the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$.

A. $\sin^2\theta = 1 - \cos^2\theta$ ✓
B. $\cos^2\theta = 1 - \sin^2\theta$ ✓
C. $\tan^2\theta = \sec^2\theta - 1$ ✓
D. $\cot^2\theta = \csc^2\theta - 1$ ✓

How can double angle identities be applied in solving trigonometric equations? Illustrate with an example.

To solve the equation \(\sin(2x) = 0.5 \), we can use the double angle identity \(\sin(2x) = 2\sin(x)\cos(x) \) to rewrite it as \(2\sin(x)\cos(x) = 0.5 \). This simplifies to \(\sin(x)\cos(x) = 0.25 \), which can be further solved for \(x \) using appropriate methods.

Discuss the significance of co-function identities in trigonometry and provide an example of their application.

Co-function identities are significant in trigonometry as they relate the sine and cosine of complementary angles, such as $\sin(\theta) = \cos(90° - \theta)$. This identity is useful in simplifying expressions and solving trigonometric equations.

What is the identity for $\sin(\alpha - \beta)$?

A. $\sin \alpha \cos \beta - \cos \alpha \sin \beta$ ✓
B. $\cos \alpha \cos \beta + \sin \alpha \sin \beta$
C. $\sin \alpha \sin \beta - \cos \alpha \cos \beta$
D. $\tan \alpha - \tan \beta$