Trig Identities Worksheet

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Part 1: Building a Foundation

Which of the following is a Pythagorean identity?

Hint: Recall the fundamental Pythagorean identities.

- ◯ A) $\sin^2\theta + \cos^2\theta = 1$
- ◯ B) $\tan^2\theta + \sec^2\theta = 1$
- ◯ C) $\sin\theta = 1/\cos\theta$
- ◯ D) $\tan\theta = \sin\theta/\cos\theta$

Select all the reciprocal identities.

Hint: Identify the identities that express one function in terms of another.

- ☐ A) $\sin\theta = 1/\csc\theta$
- ☐ B) $\cos\theta = 1/\sec\theta$
- ☐ C) $\tan\theta = \sin\theta/\cos\theta$
- ☐ D) $\csc\theta = 1/\sin\theta$

Explain the significance of the identity $\tan\theta = \sin\theta/\cos\theta$ in trigonometry.

Hint: Consider how this identity relates to the definitions of sine, cosine, and tangent.

List the three Pythagorean identities.

Hint: Recall the fundamental relationships involving sine, cosine, and tangent.

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

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

3. 3) $1 + \cot^2\theta = \csc^2\theta$

What is the reciprocal of tan θ?

Hint: Recall the definition of tangent in terms of sine and cosine.

- ◯ A) sin θ
- ◯ B) cos θ
- ◯ C) cot θ
- ◯ D) sec θ

Part 2: Application and Analysis

Which identity can be used to express cos(2θ) in terms of sin θ only?

Hint: Consider the double angle identities for cosine.

- ◯ A) $\cos(2\theta) = \cos^2\theta - \sin^2\theta$
- ◯ B) $\cos(2\theta) = 2\cos^2\theta - 1$
- ◯ C) $\cos(2\theta) = 1 - 2\sin^2\theta$
- ◯ D) $\cos(2\theta) = \sin(2\theta)$

Identify the angle sum identities.

Hint: Recall the formulas for sine, cosine, and tangent of the sum of two angles.

- ☐ A) sin(a + b) = sin a cos b + cos a sin b
- ☐ B) cos(a + b) = cos a cos b - sin a sin b
- ☐ C) tan(a + b) = (tan a + tan b)/(1 - tan a tan b)
- ☐ D) sin(a - b) = sin a cos b - cos a sin b

Solve for θ if cos(2θ) = 1/2 and θ is in the first quadrant.

Hint: Use the inverse cosine function to find the angle.

Which identity is used to transform sin a sin b into a sum?

Hint: Consider the product-to-sum identities.

- ◯ A) Product-to-Sum Identity
- ◯ B) Sum-to-Product Identity
- ◯ C) Double Angle Identity
- ◯ D) Reciprocal Identity

Which of the following expressions can be simplified using the identity $\sin^2\theta + \cos^2\theta = 1$?

Hint: Look for expressions that involve sine and cosine squared.

- ☐ A) $\sin^2\theta + \cos^2\theta$
- ☐ B) $\tan^2\theta + 1$
- ☐ C) $\sec^2\theta - \tan^2\theta$
- ☐ D) $\cot^2\theta + 1$

Part 3: Evaluation and Creation

Which identity is essential for proving that tan(a + b) = (tan a + tan b)/(1 - tan a tan b)?

Hint: Consider the angle sum identities for tangent.

- ◯ A) Angle Sum Identity for Sine
- ◯ B) Angle Sum Identity for Cosine
- ◯ C) Double Angle Identity for Tangent
- ◯ D) Reciprocal Identity

Evaluate the following statements and select those that are true regarding half-angle identities.

Hint: Consider the properties and applications of half-angle identities.

- ☐ A) They can be derived from double angle identities.
- ☐ B) They are useful for finding exact values of trigonometric functions at specific angles.
- ☐ C) They are primarily used in calculus for integration.
- ☐ D) They are equivalent to the reciprocal identities.

Create a real-world problem that involves using the sum-to-product identities to simplify an expression. Provide a detailed solution.

Hint: Think of a scenario where trigonometric functions are involved.

Propose a method to verify the identity sin(2θ) = 2sin θ cos θ using basic trigonometric identities.

Hint: Consider using the angle sum identity for sine.

1. Step 1: Use the angle sum identity for sine.

2. Step 2: Factor out the common terms.