

Tangent and Cotangent Quiz Questions and Answers PDF

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Select the true statements about the Pythagorean identities involving tangent and cotangent.

- $1 + \tan^2(\theta) = \sec^2(\theta)$ ✓
- $1 + \cot^2(\theta) = \csc^2(\theta)$ ✓
- $\tan^2(\theta) + 1 = \csc^2(\theta)$
- $\cot^2(\theta) + 1 = \sec^2(\theta)$

The Pythagorean identities involving tangent and cotangent state that $\tan^2(\theta) + 1 = \sec^2(\theta)$ and $1 + \cot^2(\theta) = \csc^2(\theta)$. These identities relate the tangent and cotangent functions to the secant and cosecant functions, respectively, and are fundamental in trigonometry.

What is the value of $\tan(0)$?

- 0 ✓
- 1
- Undefined
- ∞

The tangent of an angle in trigonometry is defined as the ratio of the opposite side to the adjacent side in a right triangle. For an angle of 0 degrees, this ratio is 0, so $\tan(0)$ equals 0.

How would you use the unit circle to find the value of $\tan(\pi/3)$?

On the unit circle, $\tan(\pi/3)$ is the ratio of the y-coordinate to the x-coordinate at the angle $\pi/3$, which is $\sqrt{3}/2$ divided by $1/2$, resulting in $\sqrt{3}$.

Discuss the significance of the tangent function in real-world applications, providing at least one example.

The tangent function is significant in calculating slopes and angles in fields like engineering and physics. For example, it is used to determine the angle of elevation in surveying.

How does the periodicity of the tangent function affect its graph and solutions to equations involving tangent?

The periodicity of the tangent function, which is π , means that its graph repeats every π units. This affects solutions to equations involving tangent, as solutions will recur every π radians.

Which of the following are true for the equation $\tan(\theta) = a$?

- It has infinite solutions. ✓
- Solutions repeat every π radians. ✓
- It is undefined for $a = 0$.
- Solutions can be found using the unit circle. ✓

The equation $\tan(\theta) = a$ is true for any angle θ where the tangent function is defined, and it has solutions in the form $\theta = \arctan(a) + n\pi$, where n is any integer, reflecting the periodic nature of the tangent function.

Describe the behavior of the cotangent function as it approaches its vertical asymptotes.

As the cotangent function approaches its vertical asymptotes, the function values increase or decrease without bound, moving towards positive or negative infinity.

What is the value of $\cot(\pi/4)$?

- 0
- 1 ✓
- $\sqrt{2}$
- Undefined

The cotangent of an angle is the reciprocal of the tangent. Since $\tan(\pi/4) = 1$, it follows that $\cot(\pi/4) = 1$.

Which of the following angles will make cotangent undefined?

- $\pi/3$
- $\pi/2$
- π ✓
- $3\pi/2$

Cotangent is undefined at angles where the sine value is zero, specifically at odd multiples of 90 degrees (or $\pi/2$ radians). This occurs at angles such as 90° , 270° , etc.

Select the correct identities involving cotangent.

- $\cot(\theta) = \cos(\theta)/\sin(\theta)$ ✓
- $\cot(\theta) = 1/\tan(\theta)$ ✓
- $\cot(\theta) = \sin(\theta)/\cos(\theta)$
- $\cot(\theta) = 1/\sin(\theta)$

Cotangent identities include the reciprocal identity $\cot(x) = 1/\tan(x)$, the Pythagorean identity $\cot^2(x) + 1 = \csc^2(x)$, and the co-function identity $\cot(90^\circ - x) = \tan(x)$. These identities are essential for simplifying

trigonometric expressions and solving equations.

At which angle is the tangent function undefined?

- 0
- $\pi/4$
- $\pi/2$ ✓
- π

The tangent function is undefined at angles where the cosine is zero, specifically at odd multiples of 90 degrees (or $\pi/2$ radians). This occurs at angles such as 90° , 270° , and so on.

What is the symmetry of the cotangent function?

- Even
- Odd ✓
- Neither
- Both

The cotangent function is an odd function, meaning it has rotational symmetry about the origin. This can be expressed mathematically as $\cot(-x) = -\cot(x)$.

What is the period of the tangent function?

- $\pi/2$
- π ✓
- 2π
- 4π

The period of the tangent function is π (pi), meaning it repeats its values every π radians.

Which identity is correct for tangent?

- $\tan(\theta) = \cos(\theta)/\sin(\theta)$
- $\tan(\theta) = \sin(\theta)/\cos(\theta)$ ✓
- $\tan(\theta) = 1/\sin(\theta)$
- $\tan(\theta) = 1/\cos(\theta)$

The correct identity for tangent is given by the formula $\tan(\theta) = \sin(\theta) / \cos(\theta)$, which expresses tangent as the ratio of sine to cosine.

Explain the relationship between the tangent and cotangent functions in terms of their graphs and asymptotes.

The tangent function, defined as $\tan(x) = \sin(x)/\cos(x)$, has vertical asymptotes at $x = (2n+1)\pi/2$ for $n \in \mathbb{Z}$, where $\cos(x) = 0$. The cotangent function, defined as $\cot(x) = \cos(x)/\sin(x)$, has vertical asymptotes at $x = n\pi$ for $n \in \mathbb{Z}$, where $\sin(x) = 0$. The graphs of these functions are periodic with a period of π , and they are reflections of each other across the line $y = x$.

Which of the following is the reciprocal of the tangent function?

- Sine
- Cosine
- Secant
- Cotangent ✓

The reciprocal of the tangent function is the cotangent function. This means that if $\tan(x) = y$, then $\cot(x) = 1/y$.

Explain why the tangent function is considered an odd function.

The tangent function is an odd function because it follows the rule $\tan(-x) = -\tan(x)$, which means that the function's values at negative angles are the negatives of the values at their corresponding positive angles.

Which of the following are true about the tangent function?

- It is periodic with period 2π .
- It is an odd function. ✓
- It has vertical asymptotes at $\theta = \pi/2 + k\pi$. ✓
- It is undefined at $\theta = k\pi$.

The tangent function is periodic with a period of π , is undefined at odd multiples of $\pi/2$, and has a range of all real numbers. It is also the ratio of the sine and cosine functions, $\tan(x) = \sin(x)/\cos(x)$.

Which of the following statements are true about the tangent graph?

- It passes through the origin. ✓
- It has a horizontal asymptote at $y = 0$.
- It is symmetric about the origin. ✓
- It repeats every π radians. ✓

The tangent graph is periodic with a period of π , has vertical asymptotes at odd multiples of $\pi/2$, and is defined for all real numbers except at those asymptotes.

Which of the following are characteristics of the cotangent function?

- Period is π . ✓
- It is an even function.
- It has vertical asymptotes at $\theta = k\pi$. ✓
- It is undefined at $\theta = \pi/2 + k\pi$.

The cotangent function is characterized by its periodicity, asymptotes, and its relationship to the tangent function, being the reciprocal of tangent. It is defined for all angles except where the sine function is zero, leading to vertical asymptotes at those points.