Sine and Cosine Quiz Questions and Answers PDF

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Describe a real-world application where sine and cosine functions are used to model periodic phenomena.

One real-world application of sine and cosine functions is in modeling sound waves, where the amplitude and frequency of the wave can be represented using these trigonometric functions to describe how sound varies over time.

How does the phase shift affect the graph of a cosine function? Provide an example with a sketch.

The phase shift affects the graph of a cosine function by shifting it horizontally. For example, the function y = cos(x - π/2) has a phase shift of π/2 to the right, resulting in the graph starting at (0, 0) instead of (0, 1).

Explain the significance of the Pythagorean identity in trigonometry.

The significance of the Pythagorean identity in trigonometry lies in its role as a foundational relationship that connects the sine and cosine functions, allowing for the derivation of other trigonometric identities and facilitating problem-solving in geometry and calculus.

How do you convert an angle from degrees to radians? Provide a formula and an example.

To convert an angle from degrees to radians, use the formula: radians = degrees × (π / 180). For example, 90 degrees is π/2 radians.

Which transformation affects the amplitude of a sine wave?

- ○ y = sin(x + C)
- ○ **y = A · sin(x) ✓**
- ○ y = sin(Bx)
- ○ y = sin(x) + D

The amplitude of a sine wave is affected by vertical scaling, which is represented by a coefficient in front of the sine function. This coefficient determines how tall or short the wave appears on a graph.

Which of the following are properties of the sine function?

- ☐ **Periodic with period 2π ✓**
- ☐ **Range [-1, 1] ✓**
- ☐ Symmetric about the y-axis
- ☐ Maximum value at π

> The sine function is periodic, oscillating between -1 and 1, and is an odd function, meaning sin(-x) = -sin(x). It also has a period of 2π and is continuous and differentiable everywhere.

What is the cosine of 0° or 0 radians?

- ◯ 0
- ◯ **1 ✓**
- ◯ -1
- ◯ √2/2

> The cosine of 0° or 0 radians is equal to 1, which is a fundamental value in trigonometry.

Which angles have a cosine value of 0?

- ☐ **90° or π/2 ✓**
- ☐ 180° or π
- ☐ **270° or 3π/2 ✓**
- ☐ 360° or 2π

> The angles that have a cosine value of 0 are 90 degrees and 270 degrees (or π/2 and 3π/2 radians). These angles correspond to the points on the unit circle where the x-coordinate is zero.

What is the period of the cosine function?

- ◯ π
- ◯ **2π ✓**
- ◯ 4π
- ◯ π/2

> The period of the cosine function is the length of one complete cycle of the wave, which is 2π radians or 360 degrees.

What is the sine of 90° or π/2 radians?

- ◯ 0
- ◯ **1 ✓**
- ◯ -1
- ◯ √2/2

> The sine of 90° or π/2 radians is equal to 1, which is a fundamental value in trigonometry. This means that at this angle, the opposite side of a right triangle is equal to the hypotenuse.

Which transformations affect the period of a sine wave?

- [ ] $y = \sin(x + C)$
- [ ] $y = A \cdot \sin(x)$
- [ ] **$y = \sin(Bx)$ ✓**
- [ ] $y = \sin(x) + D$

> The period of a sine wave is affected by horizontal transformations, specifically the coefficient of the x variable in the function. This includes changes such as stretching or compressions, which are represented by the factor that multiplies the x inside the sine function.

Which of the following is the Pythagorean identity?

- ○ $\sin(x) + \cos(x) = 1$
- ○ **$\sin^2(x) + \cos^2(x) = 1$ ✓**
- ○ $\sin(x) \cdot \cos(x) = 1$
- ○ $\sin(x) - \cos(x) = 1$

> The Pythagorean identity is a fundamental relation in trigonometry that states that for any angle θ, the square of the sine plus the square of the cosine equals one: $\sin^2(\theta) + \cos^2(\theta) = 1$.

Which of the following are double angle formulas?

- [ ] **$\sin(2x) = 2\sin(x)\cos(x)$ ✓**
- [ ] **$\cos(2x) = \cos^2(x) - \sin^2(x)$ ✓**
- [ ] $\sin(2x) = \sin^2(x) + \cos^2(x)$
- [ ] **$\cos(2x) = 1 - 2\sin^2(x)$ ✓**

> Double angle formulas are trigonometric identities that express functions of double angles in terms of single angles. Common examples include $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$ and $\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta)$.

Explain how the unit circle is used to define the sine and cosine functions for all angles.

The unit circle is a circle with a radius of 1 centered at the origin of a coordinate plane. For any angle θ, the coordinates of the point where the terminal side of the angle intersects the unit circle are (cos(θ), sin(θ)), thus defining the sine and cosine functions for all angles.

Describe the effect of a vertical shift on the graph of a sine function.

A vertical shift affects the graph of a sine function by translating it vertically; for example, the function y = sin(x) + k shifts the graph up by k units if k is positive, or down by k units if k is negative.

What is the cosine of 180° or π radians?

- ◯ 0
- ◯ 1
- ◯ **-1 ✓**
- ◯ √2/2

The cosine of 180° or π radians is -1, which is a fundamental value in trigonometry. This reflects the position of the angle on the unit circle, where the x-coordinate is -1.

In which quadrant is the sine function positive?

- ◯ **First and second ✓**
- ◯ Second and third
- ◯ Third and fourth
- ◯ First and fourth

> The sine function is positive in the first and second quadrants of the Cartesian coordinate system. This is because sine corresponds to the y-coordinate, which is above the x-axis in these quadrants.

What is the range of the sine function?

- ◯ [-2, 2]
- ◯ **[-1, 1] ✓**
- ◯ [0, 1]
- ◯ [0, 2]

> The sine function oscillates between -1 and 1, meaning it can take any value within this interval. Therefore, the range of the sine function is from -1 to 1, inclusive.

Which of the following are true about the unit circle?

- ☐ **Radius is 1 ✓**
- ☐ **Centered at the origin ✓**
- ☐ **Used to define sine and cosine for all angles ✓**
- ☐ Only applicable for angles in the first quadrant

> The unit circle is a circle with a radius of one centered at the origin of a coordinate plane, and it is used to define trigonometric functions for all angles. Key properties include that the coordinates of any point on the circle correspond to the cosine and sine of the angle formed with the positive x-axis.

Which statements about the cosine function are true?

- ☐ **Cosine is an even function ✓**
- ☐ Cosine has a period of π
- ☐ **Cosine is symmetric about the y-axis ✓**
- ☐ **Cosine equals zero at 90° and 270° ✓**

> The cosine function is an even function, periodic with a period of 2π, and its values range from -1 to 1. It is commonly used in trigonometry to relate the angles of a triangle to the lengths of its sides.