If Sin=0.4567, Find The Angle That Terminates In QI Rounded To The Nearest Tenth. A 27.2b 27.1c 0.5d

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Understanding how to find an angle when given its sine value is a fundamental concept in trigonometry. This problem involves calculating the angle corresponding to a sine value of 0.4567, then rounding it to the nearest tenth, and interpreting the results within the context of multiple-choice options labeled as 27.2b, 27.1c, and 0.5d. In this article, we will explore the step-by-step process to solve this problem, the mathematical principles involved, and tips for accurate calculations.

Understanding the Problem

The question provides a sine value, $\sin \theta = 0.4567$, and asks us to find the angle θ that corresponds to this value. The options are given in a format where the answer must be rounded to the nearest tenth, and then matched to one of the options: 27.2b, 27.1c, or 0.5d.

Key points:

- The sine value given is 0.4567.
- The task is to determine the angle θ (in degrees) corresponding to this sine value.
- The answer should be rounded to the nearest tenth.
- The options are numerical, with labels indicating multiple-choice options.

Mathematical Principles Involved

To solve this problem, the primary mathematical tools involved include:

1. Inverse Sine Function (arcsin)

The inverse sine function, denoted as $\arcsin$ or $\sin^{-1}$,

allows us to find the angle when the sine value is known:

$$
\theta = \arcsin (\sin \theta)
$$

Given $\sin \theta = 0.4567$, the principal value of θ can be calculated as:

$$
\theta = \arcsin(0.4567)
$$

Note: The arcsin function typically returns values in the range -90° to 90°.

2. Understanding the Sine Function's Range and Symmetry

Since sine is positive in both the first and second quadrants, there are generally two solutions for θ between 0° and 180°. The second solution can be found as:

$$
\theta_{2} = 180^\circ - \theta_{1}
$$

where θ_{1} is the principal value obtained from $\arcsin$.

Step-by-Step Solution

Let's now walk through the steps to find the angle corresponding to $\sin \theta = 0.4567$:

Step 1: Calculate the principal value using a calculator

Using a scientific calculator:

$$
\theta_{1} = \arcsin(0.4567)
$$

Ensure the calculator is set to degrees.

Calculating:

$$
\theta_{1} \approx \arcsin(0.4567) \approx 26.99^\circ
$$

Rounding to the nearest tenth:

$$
\theta_{1} \approx 27.0^\circ
$$

Step 2: Find the second solution

Since sine is positive, the second solution in the range 0° to 180° is:

$$
\theta_{2} = 180^\circ - 27.0^\circ = 153.0^\circ
$$

Thus, the two possible angles in the range 0° to 180° are approximately:

- $\boxed{27.0^\circ}$
- $\boxed{153.0^\circ}$

Interpreting the Options and Rounding

The options provided are:

- 27.2b
- 27.1c
- 0.5d

Since the question asks for the angle rounded to the nearest tenth, the primary answer is approximately 27.0°, which closely matches the options 27.1 and 27.2.

Comparison:

Calculated angle	Rounded to tenths	Closest option
27.0°	27.0	None listed, but closest to 27.1
153.0°	153.0	Not matching options

Given the options, the closest match to 27.0° is 27.1, which suggests the answer corresponds to option 27.1c.

Final Answer and Explanation

Based on the calculations:

- The primary solution angle in degrees is approximately 27.0°, which rounds to 27.1 when rounded to the nearest tenth.
- The second solution, 153°, is not close to any options listed.
- The options seem to be designed to test recognition of approximate values, with 27.1c being the best fit.

Therefore, the correct choice is:

27.1c

Additional Tips for Solving Similar Problems

- Always ensure your calculator is in the correct mode (degrees or radians).
- Remember that $\sin \theta$ is positive in the first and second quadrants.
- Use symmetry properties of the sine function to find additional solutions.
- Round your final answer to the required decimal place carefully.
- Cross-reference your calculated value with available options for the best match.

Conclusion

Finding an angle from a given sine value involves using the inverse sine function and understanding the properties of the sine function across different quadrants. With a sine value of 0.4567, the principal angle is approximately 27.0°, which rounds to 27.1°, matching option c. Recognizing these trigonometric principles helps solve similar problems efficiently and accurately, ensuring you can confidently determine angles in various mathematical and real-world contexts.

Keywords: sine, arcsin, inverse sine, trigonometry, angle calculation, degrees, rounding, multiple-choice, problem-solving, mathematical tips

Frequently Asked Questions

Given that sin θ = 0.4567, what is the measure of the angle θ in degrees rounded to the nearest tenth?

Approximately 27.2°

If sin θ = 0.4567, which of the following is the correct value for θ rounded to the nearest tenth: 27.2°, 27.1°, 0.5°, or 45°?

27.2°

Using a calculator, what is the inverse sine (arcsin) of 0.4567, rounded to the nearest tenth of a degree?

27.2°

When sin θ equals 0.4567, what is the primary angle θ in degrees to the nearest tenth?

27.2°

If you need to find the angle θ where sin θ = 0.4567, which option correctly represents θ rounded to the nearest tenth?

27.2°

Is the angle θ, with sin θ = 0.4567, approximately 27.2°, 27.1°, or 0.5° when rounded to the nearest tenth?

27.2°

In solving for θ given sin θ = 0.4567, what is the

value in degrees rounded to one decimal place?

27.2°

What is the value of θ in degrees, rounded to the nearest tenth, if sin θ = 0.4567?

27.2°

Additional Resources

Trigonometry Insights: Determining an Angle from a Given Sine Value

When delving into the realm of trigonometry, one of the fundamental pursuits is translating a given sine value into its corresponding angles. This process is essential not only in academic settings but also in practical applications such as engineering, navigation, and physics. Today, we'll explore a specific problem: If sin = 0.4567, find the angle that terminates in QI rounded to the nearest tenth. Along the way, we'll dissect the problem, explain key concepts, and walk through the solution step-by-step, all while maintaining an engaging and informative tone.

Understanding the Problem Statement

Before diving into calculations, it's vital to comprehend what the problem entails:

- Given: sin θ = 0.4567
- Task: Find the angle θ in degrees, rounded to the nearest tenth
- Additional context: The phrase "that terminates in QI rounded to the nearest tenth" appears to be a typographical or transcription error. It might refer to specifying the quadrant, or perhaps "QI" is shorthand for a particular quadrant, or indicates the angle's position in a certain quadrant. For our purposes, we'll interpret it as the task of finding the principal angle that corresponds to the given sine value, considering the common quadrants where sine is positive or negative.

Foundational Concepts in Trigonometry

To approach this problem effectively, let's revisit some essential

trigonometric principles.

1. The Sine Function and Its Range

- The sine of an angle in a right triangle is the ratio of the length of the side opposite the angle to the hypotenuse.
- The sine function oscillates between -1 and 1, inclusive.
- For this problem, since sin θ = 0.4567, the value is within the valid range, and the angle is likely in the first or second quadrant (where sine is positive).

2. Principal Values and Inverse Sine

- The inverse sine function, denoted as $\sin^{-1}$ or arcsin, allows us to find the angle given a sine value.
- The principal value of arcsin is typically in the range [-90°, 90°].

3. Quadrants and Sine Significance

- Quadrant I (0° to 90°): Sine is positive.
- Quadrant II (90° to 180°): Sine is positive.
- Quadrants III and IV: Sine is negative.

Given that sin θ = 0.4567, which is positive, θ could be in either Quadrant I or Quadrant II.

Step-by-Step Solution Approach

Let's proceed systematically to find the angle θ.

1. Calculating the Principal Angle

Using a calculator or computational tool:

- $\theta_1 = \arcsin(0.4567)$

Assuming the calculator is in degree mode:

- $\theta_1 \approx \arcsin(0.4567) \approx 27.2°$

This is the principal value, corresponding to Quadrant I.

2. Determining the Second Possible Angle

Since sine is positive in both Quadrant I and Quadrant II, the second solution within 0° to 180° is:

- $\theta_2 = 180° - \theta_1 \approx 180° - 27.2° \approx 152.8°$

Thus, the two possible angles in the range 0° to 180° are approximately:

- 27.2°
- 152.8°

Interpreting the "Terminating in QI" Phrase

The phrase "that terminates in QI rounded to the nearest tenth" might suggest a specific focus on a particular quadrant or a certain range. Given the typical mathematical context, it might imply:

- Quadrant I (QI): angles between 0° and 90°
- Quadrant II: angles between 90° and 180°

If the task is to find the angle specifically in Quadrant I, then:

- Answer: 27.2°

If the question considers the possibility of angles in other quadrants (which is common in trigonometry), then:

- Answer: 152.8°, rounded to the nearest tenth, is 152.8°.

Final Answer and Summary

Based on the above analysis, the angle θ corresponding to $\sin \theta = 0.4567$, rounded to the nearest tenth, is:

- In Quadrant I: 27.2°
- In Quadrant II: 152.8°

Given the typical context of such problems, and assuming the focus is on the primary (or principal) angle in Quadrant I, the most relevant answer is:

27.2°

Additional Insights and Practical Applications

Understanding how to find an angle from its sine value has broad applications:

- Engineering: Calculating angles in design and signal processing.
- Navigation: Determining course angles based on sine components.
- Physics: Analyzing projectile trajectories and wave mechanics.

Furthermore, being able to interpret the inverse sine and understand the significance of multiple solutions enhances problem-solving versatility.

Summary Table of Key Points

Concept	Explanation	Application
Sine range	-1 to 1	Valid input for arcsin
Principal angle	arcsin(value)	First solution, in Quadrant I
Second solution	180° - principal	Corresponds to Quadrant II
Rounding	To nearest tenth	Standard in most calculations

Conclusion

Finding the angle from a sine value like 0.4567 involves understanding the inverse sine function and the properties of the sine wave across different quadrants. In this case, the principal angle in Quadrant I is approximately 27.2°, which is the most straightforward answer if one is asked for the primary solution. If the problem's context requires considering all possible angles, then 152.8° is also relevant.

Mastering these concepts ensures precise and reliable calculations across various scientific and engineering disciplines. Whether you're tackling classroom problems or real-world scenarios, the ability to interpret and manipulate trigonometric functions remains an invaluable skill.

Note: Always verify calculator mode (degrees vs. radians) before performing

inverse trigonometric calculations to ensure accuracy.

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