

The Area Of A Circle Is 27.36cm². Find The Length Of The Radius Rounded To 2 DP.

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Introduction

Understanding how to find the radius of a circle when its area is known is a fundamental concept in geometry. This problem involves calculating the radius given a specific area, which is essential for students and professionals working with circular measurements in fields such as engineering, architecture, and design. In this article, we will explore the formulae involved, step-by-step solutions, and tips to ensure accurate calculations. Whether you're a student preparing for exams or a professional needing quick calculations, this guide will help you master the process of finding the radius from the area of a circle.

Understanding the Area of a Circle

What Is the Area of a Circle?

The area of a circle is the amount of space enclosed within its boundary. It is measured in square units, such as square centimeters (cm²), square meters (m²), etc. The formula to calculate the area (A) of a circle is:

$$[A = \pi r^2]$$

where:

- A is the area,
- r is the radius of the circle,
- π is a mathematical constant approximately equal to 3.14159.

Importance of Radius in Circles

The radius of a circle is the distance from the center to any point on the circumference. Knowing the radius allows you to determine other properties of the circle, such as diameter, circumference, and area.

Problem Statement Breakdown

Given:

- Area $A = 27.36 \text{ cm}^2$

Find:

- Radius r , rounded to 2 decimal places (DP)

This problem requires rearranging the area formula to solve for the radius and then performing the necessary calculations.

Step-by-Step Solution

Step 1: Recall the formula for the area of a circle

$$A = \pi r^2$$

Step 2: Rearrange the formula to solve for r

$$r^2 = \frac{A}{\pi}$$

$$r = \sqrt{\frac{A}{\pi}}$$

Step 3: Substitute known values into the equation

$$r = \sqrt{\frac{27.36}{\pi}}$$

Using $\pi \approx 3.14159$:

$$r = \sqrt{\frac{27.36}{3.14159}}$$

Step 4: Perform the division

$$\frac{27.36}{3.14159} \approx 8.708$$

Step 5: Calculate the square root

$$r = \sqrt{8.708}$$

Using a calculator:

$$r \approx 2.952$$

Step 6: Round to 2 decimal places

$$r \approx 2.95, \text{ cm}$$

Final Answer

The length of the radius rounded to 2 decimal places is 2.95 cm.

Additional Considerations

Why Rounding Matters

In practical applications, precise measurements are essential. Rounding to two decimal places ensures a balance between accuracy and usability, especially when measurements are used for manufacturing or construction.

Verifying the Calculation

To verify the calculation:

- Square the radius: $(2.95)^2 = 8.7025$
- Multiply by (π) : $(8.7025 \times 3.14159 \approx 27.3)$

This closely matches the given area, confirming the correctness of the radius.

Related Concepts and Applications

Calculating Diameter and Circumference

Once the radius is known, other properties of the circle can be calculated:

- Diameter (d):

$$\text{\textbackslash} d = 2r \text{\textbackslash}$$

- Circumference (C):

$$\text{\textbackslash} C = 2\pi r \text{\textbackslash}$$

Practical Applications

- Design of circular objects (e.g., wheels, pipes)
- Area calculations in landscaping and architecture
- Engineering projects involving circular components
- Mathematical problem-solving and exams

Tips for Solving Similar Problems

- Always write down the formula clearly.
- Rearrange formulas carefully to solve for the unknown.
- Use a calculator for precise calculations.
- Keep track of units throughout the process.
- Round your final answer to the required decimal places.

Common Mistakes to Avoid

- Forgetting to include π in the calculation.
- Mixing up the formula for area with other circle properties.
- Incorrectly rounding or truncating intermediate steps.
- Not verifying calculations with reverse operations.

Summary

In summary, finding the radius of a circle when given its area involves understanding and manipulating the fundamental formula $A = \pi r^2$. By isolating r and performing the calculations carefully, you find that the radius corresponding to an area of 27.36 cm^2 is approximately 2.95 cm when rounded to two decimal places. Mastery of these steps enhances your ability to solve various geometric problems efficiently.

Frequently Asked Questions (FAQs)

Q1: What is the significance of pi in circle calculations?

A1: Pi (π) is a constant that relates the circumference and diameter of a circle and appears in formulas calculating area and circumference.

Q2: How do I ensure accuracy when calculating the square root?

A2: Use a reliable calculator and keep track of decimal places throughout the process. Cross-verify by substituting the result back into the formula.

Q3: Can I use an approximation of pi?

A3: Yes, but for more precise results, especially in technical fields, use more decimal places of π .

Q4: How would the radius change if the area increased?

A4: Since $r = \sqrt{\frac{A}{\pi}}$, increasing the area would increase the radius, but at the rate of the square root of the change.

Conclusion

Understanding how to find the radius from a given area is a vital skill in geometry. With the steps outlined above, you can confidently solve similar problems and apply these principles to real-world situations. Remember to always double-check your calculations and understand the underlying formulas to ensure accuracy and confidence in your mathematical reasoning.

Frequently Asked Questions

What is the formula to find the area of a circle?

The area of a circle is given by the formula $A = \pi r^2$, where r is the radius.

How do you find the radius of a circle when the area is known?

Rearranged, the radius $r = \sqrt{(A/\pi)}$. Substitute the known area into this formula to find the radius.

Given the area of 27.36 cm², what steps are involved in calculating the radius?

First, divide the area by π (approximately 3.1416), then take the square root of the result to find the radius.

What is the approximate radius of the circle with an area of 27.36 cm², rounded to two decimal places?

The radius is approximately 2.95 cm.

Why is it important to round the radius to two decimal places in this

problem?

Rounding to two decimal places provides a precise yet manageable value suitable for practical purposes and standard reporting.

How does the value of π affect the calculation of the radius in this problem?

π is used in the formula for the area of a circle; substituting its approximate value (3.1416) is essential for accurate calculation of the radius.

Can the radius be directly calculated without using π ? Why or why not?

No, because the formula for the area involves π ; it must be used in the calculation to accurately determine the radius.

Additional Resources

The Area Of A Circle Is 27.36cm². Find The Length Of The Radius Rounded To 2 DP.

Understanding the relationship between a circle's area and its radius is fundamental in geometry. When given the area of a circle, calculating its radius involves applying the formula for the area of a circle, which is deeply rooted in the properties of π (pi). This problem not only tests one's ability to manipulate algebraic expressions but also reinforces the importance of precision in numerical calculations, especially when rounding to a specified number of decimal places. In this review, we will explore the process of finding the radius from the given area, examine the mathematical principles involved, and discuss the applications, pros, and cons of such calculations.

Understanding the Area of a Circle

The formula for the area (A) of a circle is given by:

$$A = \pi r^2$$

where:

- (A) is the area,
- (r) is the radius,
- (π) is a mathematical constant approximately equal to 3.14159.

Given the area, the goal is to determine the radius. This involves rearranging the formula:

$$r = \sqrt{\frac{A}{\pi}}$$

This simple yet powerful relationship allows us to transition from area to radius seamlessly, provided we handle the calculations with care, especially considering the value of π and the rounding requirements.

Step-by-Step Calculation to Find the Radius

Let's analyze the specific problem: the area ($A = 27.36 \text{ cm}^2$), and we need to find the radius (r) rounded to 2 decimal places.

Step 1: Write down the known values

- Area, $(A = 27.36 \text{ cm}^2)$

- π 3.14159

Step 2: Apply the formula for radius

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{27.36}{3.14159}}$$

Step 3: Perform the division inside the square root

$$\frac{27.36}{3.14159} \approx 8.7178$$

Step 4: Calculate the square root

$$r \approx \sqrt{8.7178} \approx 2.95$$

Step 5: Round to 2 decimal places

The radius rounded to two decimal places is 2.95 cm.

Mathematical Principles and Considerations

The calculation hinges on correctly manipulating the area formula and using an accurate value for π .

Some key points include:

- Precision of π : Using π approximated to 5 decimal places (3.14159) is generally sufficient for most calculations. However, for more precise applications, more decimal places may be used.
- Rounding rules: When rounding to 2 decimal places, examine the third decimal digit to determine whether to round up or down.
- Square root operation: The square root can be computed using a calculator or approximation methods, which should be accurate enough to ensure the final answer is reliable.

Applications of the Radius Calculation

Calculating the radius from the area of a circle has a wide range of practical applications across various fields:

- Engineering and Design: Determining the size of circular components, such as pipes or wheels, based on area constraints.
- Architecture: Planning circular structures where the area is specified, such as fountains or domes.
- Manufacturing: Cutting circular materials with precise radii based on area measurements.
- Education: Teaching students the relationship between geometric formulas and real-world problem

solving.

Pros and Cons of Calculating the Radius from the Area

Pros:

- Fundamental skill: Reinforces understanding of geometric formulas and their applications.
- Versatility: Can be applied to numerous real-world scenarios involving circles.
- Precision: Allows for accurate measurements in engineering and design.

Cons:

- Dependence on accurate constants: Slight variations in π approximation can lead to small errors.
- Rounding errors: Rounding to too few decimal places can introduce inaccuracies.
- Measurement errors: If the area measurement is imprecise, the calculated radius will also be inaccurate.

Features and Additional Insights

- Use of calculators: A scientific calculator simplifies the process, especially for square roots and division.
- Importance of units: Always keep track of units to ensure the final radius is in the correct measurement units.
- Alternative methods: For complex geometrical problems, software tools like GeoGebra or CAD

programs can perform such calculations with high precision.

- Error analysis: Understanding how rounding and approximation affect the outcome is crucial in sensitive applications.

Conclusion

In summary, given that the area of a circle is 27.36 cm^2 , the length of the radius, rounded to two decimal places, is approximately 2.95 cm. This calculation exemplifies the fundamental relationship between a circle's area and its radius, highlighting the importance of precise mathematical operations and attention to detail in rounding. Whether in academic settings, engineering, or everyday problem-solving, mastering such calculations enhances one's ability to interpret and manipulate geometric data effectively. The process underscores the elegance of geometry and the utility of mathematical formulas in translating abstract measurements into tangible dimensions.

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