

**Two Complementary Angles Are In The Ratio 3: 2. The Number Of Degrees In The Smaller Angle Is A. 18 B.**

## **Understanding the Problem: Complementary Angles and Their Ratio**

**Two Complementary Angles Are In The Ratio 3: 2. The Number Of Degrees In The Smaller Angle Is A. 18 B.**

This problem revolves around the fundamental concepts of angles and their relationships, specifically focusing on complementary angles. Complementary angles are two angles whose measures add up to 90 degrees. The problem states that these two angles are in the ratio 3:2, which implies a proportional relationship between their measures. The question then asks us to determine the measure of the smaller angle, with options A. 18 and B. (implying another value). In this article, we will explore how to approach such problems systematically, understand the underlying principles, and arrive at the correct answer through detailed steps.

## **Fundamental Concepts: Complementary Angles and Ratios**

### **What Are Complementary Angles?**

- Two angles are called complementary if their sum equals 90 degrees.
- Mathematically, if angles are A and B, then  $A + B = 90^\circ$ .
- Complementary angles can be adjacent (forming a right angle) or non-adjacent; the defining feature is their sum.

## Understanding Ratios of Angles

- The ratio 3:2 indicates that if the smaller angle is represented as 2 parts, the larger is 3 parts.
- This proportional relationship helps us set up algebraic expressions for the angles.
- Ratios are a powerful way to relate quantities, especially when direct measurements are not provided.

## Step-by-Step Approach to Solving the Problem

### Step 1: Assign Variables to the Angles

Let the smaller angle be represented as  $2x$ , and the larger angle as  $3x$ , based on the ratio 3:2.

### Step 2: Use the Complementary Angle Condition

Since the angles are complementary, their measures add up to  $90^\circ$ :

- $2x + 3x = 90^\circ$

### Step 3: Solve for $x$

- Combine like terms:  $5x = 90^\circ$
- Divide both sides by 5:  $x = 90^\circ / 5$
- Calculate:  $x = 18^\circ$

## Step 4: Find the Smaller Angle

Recall that the smaller angle is  $2x$ :

- $2x = 2 \cdot 18^\circ = 36^\circ$

## Interpreting the Result and the Provided Options

### Option A: 18 Degrees

- Our calculation shows the smaller angle is  $36^\circ$ , not  $18^\circ$ , indicating that option A may be a distractor or possibly related to a different part of the problem.

### Option B: The Number of Degrees Is (implied to be $36^\circ$ )

- Given the calculations, the measure of the smaller angle is  $36^\circ$ , which aligns with the ratio 3:2 and the sum of  $90^\circ$ .
- Thus, option B (assuming it corresponds to  $36^\circ$ ) is the correct answer.

## Clarifying the Confusion in the Question

The initial statement suggests two options, A and B, with A being 18 degrees. However, our calculations yield 36 degrees for the smaller angle. This discrepancy hints at a possible typo or misinterpretation in the original question. Alternatively, the options might have been misrepresented. To clarify:

- If the options are meant to be 18 and 36, then  $36^\circ$  is the correct measure of the smaller angle.
- If  $18^\circ$  is an option, it could relate to another aspect of the problem or a different ratio.

## Additional Insights and Related Problems

### Alternative Ratios and Their Effects

- Changing the ratio alters the measures of the angles but the method remains the same: assign variables based on ratio, set up the sum equation, and solve.
- For example, if the ratio was 4:3, the process would involve similar steps but different calculations.

### Other Types of Angle Problems

- Angles in a straight line (sum to  $180^\circ$ )
- Angles in a triangle (sum to  $180^\circ$ )
- Angles in a quadrilateral (sum to  $360^\circ$ )

## Conclusion: Final Answer and Summary

Based on the detailed calculations and the logic applied, the measure of the smaller angle in the scenario where two angles are complementary and in the ratio 3:2 is  $36^\circ$ . This conclusion aligns with the mathematical process of assigning variables, setting up the sum equation, and solving for the unknown. Therefore, if the options are A. 18 and B. 36, the correct choice is B. 36.

This problem illustrates the importance of understanding ratios, algebraic methods, and properties of angles in geometry. Mastery of these concepts allows for efficient problem-solving and accurate results in various geometric contexts.

## Frequently Asked Questions

**What is the measure of the smaller angle when two complementary angles are in the ratio 3:2?**

The smaller angle measures 36 degrees.

**How do you find the measure of each angle when two complementary angles are in a ratio of 3:2?**

Let the smaller angle be  $2x$  and the larger be  $3x$ . Since they are complementary, their sum is  $90^\circ$ , so  $2x + 3x = 90^\circ$ , giving  $5x = 90^\circ$ , so  $x = 18^\circ$ . The smaller angle is  $2x = 36^\circ$ , and the larger is  $54^\circ$ .

**If one of the complementary angles is  $18^\circ$ , what is the other angle?**

The other angle is  $72^\circ$ , since  $90^\circ - 18^\circ = 72^\circ$ .

**What is the ratio of the two angles if the smaller angle measures 36 degrees and they are complementary?**

The ratio of the larger to the smaller angle is  $54:36$ , which simplifies to  $3:2$ .

**Is 18 degrees a possible measure for the smaller angle in the ratio 3:2 for complementary angles?**

No, because in the ratio  $3:2$ , the smaller angle is 36 degrees, not 18 degrees.

## Additional Resources

Two Complementary Angles Are In The Ratio 3:2. The Number Of Degrees In The Smaller Angle Is A. 18 B. is a classic problem that combines basic geometry concepts with ratio and algebraic reasoning. Such problems are frequently encountered in high school mathematics, and understanding how to approach them builds a strong foundation for more complex geometric and algebraic tasks. In this article, we will provide a comprehensive breakdown of how to solve this problem step-by-step, along with related insights, to help you master the concept of complementary angles and ratios.

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Understanding the Problem

Before jumping into calculations, let's carefully interpret what the problem states:

- "Two complementary angles": These are two angles whose measures add up to 90 degrees.
- "Are in the ratio 3:2": The measures of these angles are proportional to 3 parts and 2 parts, respectively.
- "The number of degrees in the smaller angle": Our goal is to find the measure (in degrees) of the smaller of the two angles.

The options given are A. 18 and B. (likely another value). Since only 18 is explicitly given, we'll focus primarily on how to determine if 18 degrees can be the measure of the smaller angle in such a scenario.

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Step 1: Define the Variables

Suppose:

- The smaller angle measures  $x$  degrees.
- The larger angle measures  $y$  degrees.

Because the angles are in the ratio 3:2, we can express them as:

- Smaller angle:  $3k$
- Larger angle:  $2k$

where  $k$  is a positive real number representing the unit of ratio.

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Step 2: Use the Complementary Angle Property

Since the angles are complementary:

$$\text{Sum of the angles} = 90^\circ$$

This gives:

$$3k + 2k = 90$$

$$5k = 90$$

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Step 3: Solve for the Ratio Constant  $k$

Dividing both sides by 5:

$$\left[ k = \frac{90}{5} = 18 \right]$$

Now, plug this value back into the expressions for the angles:

- Smaller angle:  $(3k = 3 \times 18 = 54^\circ)$

- Larger angle:  $(2k = 2 \times 18 = 36^\circ)$

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#### Step 4: Interpret the Results

The measure of the smaller angle is 36 degrees. Therefore, the smaller angle in this complementary pair, given the ratio 3:2, is 36 degrees.

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Clarification: Why Not 18 Degrees?

Given the options, if the question asks "The number of degrees in the smaller angle is A. 18 B. ...", then:

- The calculated smaller angle is 54 degrees.

- The ratio of 3:2 with 54 degrees as the smaller angle would mean the larger angle is:

$$\left[ y = \frac{2}{3} \times 54 = 36^\circ \right]$$

which aligns with the ratio.

Alternatively, if the question was asking for the measure of the smaller angle assuming it is 18 degrees, then:

- The ratio would be  $(18 : y)$ .

- Since the angles are complementary:

$$\left[ 18 + y = 90 \Rightarrow y = 72 \right]$$

- Check the ratio:

$$\left[ \frac{18}{72} = \frac{1}{4} \neq \frac{3}{2} \right]$$

so 18 degrees can't be the smaller angle if the ratio is 3:2.

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## Broader Insights and Related Concepts

### 1. Complementary vs. Supplementary Angles

- Complementary angles sum to 90 degrees.
- Supplementary angles sum to 180 degrees.

Understanding the difference is fundamental to solving many geometric problems.

### 2. Ratios in Geometry

Ratios are a powerful tool in geometry, especially when dealing with similar triangles, proportional segments, and angles. Recognizing ratios allows you to set up algebraic equations that lead to solutions.

### 3. Proportions and Algebra

The key skill demonstrated here is translating a ratio into an algebraic equation and solving for the unknowns. This approach is applicable in numerous geometric problems involving ratios, proportions, and similar figures.

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## Summary of the Solution Steps

Here's a quick recap of the process:

1. Define the angles based on the ratio:  $(3k^\circ)$  and  $(2k^\circ)$ .
2. Use the complementary property:  $(3k + 2k = 90^\circ)$ .
3. Solve for  $(k)$ :  $(5k = 90 \Rightarrow k = 18)$ .
4. Find the smaller angle:  $(3k = 54^\circ)$ .

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## Final Notes and Practice Problems

- Practice Problem 1: Two angles are in the ratio 4:1, and they are complementary. Find the measure of each angle.
- Practice Problem 2: Two angles are supplementary and in the ratio 5:2. Find their measures.
- Practice Problem 3: If the smaller angle of a complementary pair is 30 degrees, what is the ratio of the larger to the smaller angle?



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## Conclusion

The problem "Two Complementary Angles Are In The Ratio 3:2. The Number Of Degrees In The Smaller Angle Is A. 18 B." showcases how ratio and algebraic methods work hand-in-hand to solve geometric angle problems. By carefully setting up equations based on known properties and ratios, we can determine precise angle measures efficiently. Always remember to interpret the problem carefully, define variables clearly, and verify your solutions against the given constraints. Mastery of these fundamental concepts paves the way for tackling a wide array of geometry challenges confidently.

## **Two Complementary Angles Are In The Ratio 3 2 The Number Of Degrees In The Smaller Angle Isa 18 B**

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