

complementary and supplementary angles answer key

Complementary and supplementary angles answer key are essential concepts in geometry that help us understand the relationship between angles. These two types of angles play a critical role in various mathematical applications, including trigonometry, geometry, and real-world problem solving. In this article, we will explore the definitions, properties, and examples of complementary and supplementary angles, along with an answer key to help clarify these concepts.

Understanding Complementary Angles

Definition of Complementary Angles

Complementary angles are two angles whose measures add up to 90 degrees. This means if one angle measures x degrees, the other angle must measure $(90 - x)$ degrees to be considered complementary.

Properties of Complementary Angles

1. Sum: The most crucial property is that the sum of the angles is always 90 degrees.
2. Types: Complementary angles can be acute angles (less than 90 degrees) or one angle can be acute while the other is right (exactly 90 degrees).
3. Visual Representation: When two angles are complementary, they can be positioned such that they form a right angle together.

Examples of Complementary Angles

1. Example 1: If one angle measures 30 degrees, what is the measure of its complementary angle?

- Solution: $(90 - 30 = 60)$ degrees.

2. Example 2: If one angle measures 45 degrees, what is the measure of its complementary angle?

- Solution: $(90 - 45 = 45)$ degrees (both angles are equal).

3. Example 3: If one angle measures 70 degrees, what is the measure of its complementary angle?

- Solution: $(90 - 70 = 20)$ degrees.

Understanding Supplementary Angles

Definition of Supplementary Angles

Supplementary angles are two angles whose measures add up to 180 degrees. Therefore, if one angle measures (x) degrees, the other must measure $(180 - x)$ degrees to be supplementary.

Properties of Supplementary Angles

1. Sum: The sum of supplementary angles is always 180 degrees.
2. Types: Supplementary angles can be acute (less than 90 degrees), obtuse (more than 90 and less than 180 degrees), or one angle can be straight (exactly 180 degrees).
3. Visual Representation: Supplementary angles can be arranged in a linear pair, forming a straight line together.

Examples of Supplementary Angles

1. Example 1: If one angle measures 110 degrees, what is the measure of its supplementary angle?

- Solution: $(180 - 110 = 70)$ degrees.

2. Example 2: If one angle measures 90 degrees, what is the measure of its supplementary angle?

- Solution: $(180 - 90 = 90)$ degrees (both angles are equal).

3. Example 3: If one angle measures 30 degrees, what is the measure of its supplementary angle?

- Solution: $(180 - 30 = 150)$ degrees.

Comparing Complementary and Supplementary Angles

Key Differences

- Sum:

- Complementary angles sum to 90 degrees.

- Supplementary angles sum to 180 degrees.

- Angle Types:

- Complementary angles are generally acute or right.

- Supplementary angles can be acute, obtuse, or straight.

- Visual Representation:

- Complementary angles can create a right angle when placed adjacent to each other.

- Supplementary angles can form a straight line.

Real-World Applications

Understanding complementary and supplementary angles is crucial in various fields, including:

1. Architecture: To ensure correct angles in building designs.

2. Engineering: Where precise angle measurements are necessary for functionality.

3. Art: In design and composition, angles are essential for aesthetics.
4. Sports: In fields like gymnastics or diving, understanding angles can improve performance.

Practice Problems and Answer Key

Here are some practice problems related to complementary and supplementary angles. The answers will follow the problems.

1. Problem 1: Find the complementary angle of 37 degrees.
2. Problem 2: If one angle measures 65 degrees, find its supplementary angle.
3. Problem 3: What are the complementary angles of 55 degrees and 35 degrees respectively?
4. Problem 4: If two angles are supplementary and one measures 92 degrees, what is the measure of the other angle?
5. Problem 5: Identify two angles that are complementary and one measures 25 degrees.

Answer Key

1. Answer to Problem 1: $(90 - 37 = 53)$ degrees.
2. Answer to Problem 2: $(180 - 65 = 115)$ degrees.
3. Answer to Problem 3: The complementary angle of 55 degrees is $(90 - 55 = 35)$ degrees, and the complementary angle of 35 degrees is $(90 - 35 = 55)$ degrees.
4. Answer to Problem 4: $(180 - 92 = 88)$ degrees.
5. Answer to Problem 5: The complementary angle of 25 degrees is $(90 - 25 = 65)$ degrees. Thus, 25 degrees and 65 degrees are complementary angles.

Conclusion

In conclusion, understanding complementary and supplementary angles is fundamental in geometry

and various real-world applications. By grasping these concepts, students can enhance their problem-solving skills and apply these principles in practical situations. Whether you're a student or a professional, knowing how to work with angles is a valuable skill that will serve you well in many contexts. Through practice and application, mastering these concepts can lead to a deeper appreciation of the beauty and structure within mathematics.

Frequently Asked Questions

What are complementary angles?

Complementary angles are two angles whose measures add up to 90 degrees.

What are supplementary angles?

Supplementary angles are two angles whose measures add up to 180 degrees.

If one angle measures 30 degrees, what is the measure of its complementary angle?

The complementary angle would measure 60 degrees, since $90 - 30 = 60$.

If two angles are supplementary and one measures 110 degrees, what is the measure of the other angle?

The other angle would measure 70 degrees, since $180 - 110 = 70$.

Can two angles be both complementary and supplementary?

No, two angles cannot be both complementary and supplementary because complementary angles add up to 90 degrees, while supplementary angles add up to 180 degrees.

What is the relationship between complementary angles in a right triangle?

In a right triangle, the two non-right angles are complementary, meaning their measures add up to 90 degrees.

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