Special Right Triangle Worksheet

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Part 1: Building a Foundation

Which of the following is a characteristic of a 30-60-90 triangle?

Hint: Think about the relationships between the sides and angles.

- ◯ A) All sides are equal
- ◯ B) The hypotenuse is √2 times the length of a leg
- ◯ C) The side opposite the 30-degree angle is the shortest
- ◯ D) The side opposite the 60-degree angle is the shortest

Which of the following statements are true about 45-45-90 triangles? (Select all that apply)

Hint: Consider the properties of isosceles right triangles.

- ☐ A) Both legs are of equal length
- ☐ B) The hypotenuse is twice the length of a leg
- ☐ C) The angles are 45 degrees, 45 degrees, and 90 degrees
- ☐ D) The side ratios are 1:1:√2

Explain the significance of the side ratios in a 30-60-90 triangle and how they are derived.

Hint: Consider how the angles relate to the lengths of the sides.

List the angle measures and corresponding side ratios for both 30-60-90 and 45-45-90 triangles.

Hint: Think about the angles and how they relate to the sides.

1. 30-60-90 triangle angles and ratios

2. 45-45-90 triangle angles and ratios

Part 2: Comprehension and Application

If the shortest side of a 30-60-90 triangle is 5 units, what is the length of the hypotenuse?

Hint: Use the side ratios of a 30-60-90 triangle.

- ◯ A) 5 units
- ◯ B) 10 units
- ◯ C) 5√3 units
- ◯ D) 15 units

In a 45-45-90 triangle, if one leg measures 7 units, which of the following are true? (Select all that apply)

Hint: Consider the properties of isosceles right triangles.

- ☐ A) The other leg measures 7 units
- ☐ B) The hypotenuse measures 7√2 units
- ☐ C) The hypotenuse measures 14 units
- ☐ D) The angles are 30 degrees, 60 degrees, and 90 degrees

Describe how the Pythagorean theorem is used to verify the side lengths of a 45-45-90 triangle.

Hint: Think about the relationship between the sides and the theorem.

A ladder leans against a wall forming a 30-degree angle with the ground. If the ladder is 10 feet long, how far is the base of the ladder from the wall?

Hint: Use the properties of a 30-60-90 triangle.

- ◯ A) 5 feet
- ◯ B) 10 feet
- ◯ C) 5√3 feet
- ◯ D) 10√3 feet

Part 3: Analysis, Evaluation, and Creation

Which of the following best explains why the side opposite the 60-degree angle in a 30-60-90 triangle is √3 times the shortest side?

Hint: Consider the properties of the triangle and trigonometric functions.

- ◯ A) It is derived from the Pythagorean theorem
- ◯ B) It is a property of all right triangles
- ◯ C) It is based on the definition of sine and cosine
- ◯ D) It is a result of the triangle's symmetry

Analyze the following scenarios and identify which involve a 45-45-90 triangle. (Select all that apply)

Hint: Think about the properties of isosceles right triangles.

- ☐ A) A square cut diagonally
- ☐ B) A right triangle with angles 30, 60, and 90 degrees
- ☐ C) An isosceles right triangle
- ☐ D) A triangle with sides 3, 4, and 5

Compare and contrast the properties of 30-60-90 and 45-45-90 triangles, focusing on their side ratios and angle measures.

Hint: Consider how the angles affect the side lengths.

If you need to create a right triangle with a hypotenuse of 20 units and one angle of 45 degrees, what will be the length of each leg?

Hint: Use the properties of a 45-45-90 triangle.

- A) 10 units
- B) $10\sqrt{2}$ units
- C) 20 units
- D) $20\sqrt{2}$ units

Design a real-world problem involving a 30-60-90 triangle, and explain how you would solve it using the properties of the triangle.

Hint: Think about practical applications of these triangles.

Propose two different scenarios where using a 45-45-90 triangle would be beneficial, and explain why.

Hint: Consider situations that require equal leg lengths.

1. Scenario 1

2. Scenario 2