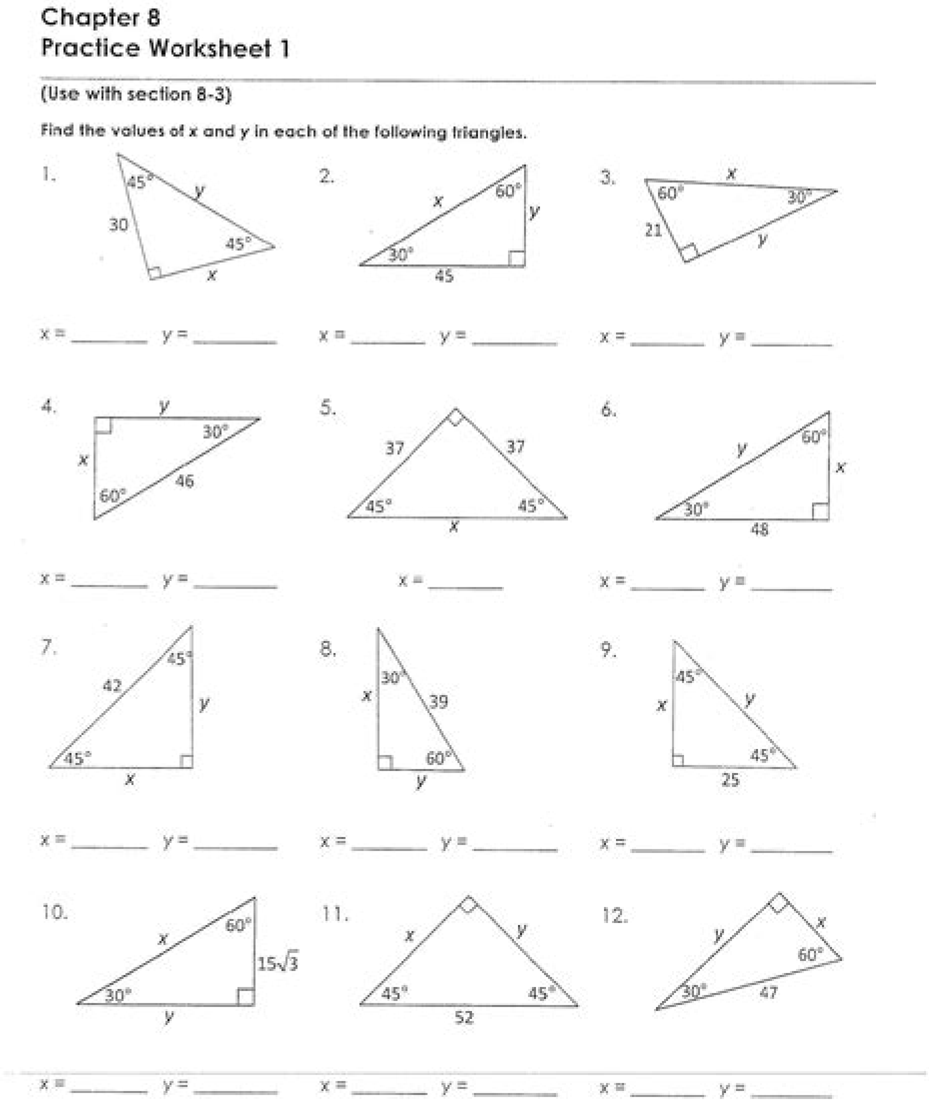
Special Right Triangles Mixed Practice Worksheet Answers


45°
y
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42
y
45°
x
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39
60°
y
45°
x
y
45°
25
x
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$15\sqrt{3}$
30°
y
x
y
45°
45°
52
y
x
60°
30°
47

Chapter 8
Practice Worksheet 1

(Use with section 8-3)

Find the values of x and y in each of the following triangles.

1. x = ________ y = ________
2. x = ________ y = ________
3. x = ________ y = ________
4. x = ________ y = ________
5. x = ________
6. x = ________ y = ________
7. x = ________ y = ________
8. x = ________ y = ________
9. x = ________ y = ________
10. x = ________ y = ________
11. x = ________ y = ________
12. x = ________ y = ________

Special right triangles mixed practice worksheet answers are essential for students looking to solidify their understanding of geometry, particularly in the context of right triangles. Understanding the properties of special right triangles—namely, the 45-45-90 triangle and the 30-60-90 triangle—can serve as a foundation for solving more complex mathematical problems. This article will explore the characteristics of these triangles, provide examples of problems found on mixed practice worksheets, and offer detailed solutions to help students reinforce their knowledge.

Understanding Special Right Triangles

Special right triangles include two specific types: the 45-45-90 triangle and the 30-60-90 triangle. Each of these triangles has unique properties that make them easier to work with than generic right triangles.

45-45-90 Triangle

In a 45-45-90 triangle:

- The angles are 45°, 45°, and 90°.
- The sides opposite the 45° angles are equal in length.
- If the legs of the triangle are of length x, then the hypotenuse will be $x\sqrt{2}$.

Example: If the legs of a 45-45-90 triangle measure 5 units, the hypotenuse can be calculated as follows:

- Hypotenuse = $5\sqrt{2} \approx 7.07$ units.

30-60-90 Triangle

In a 30-60-90 triangle:

- The angles measure 30°, 60°, and 90°.
- The side opposite the 30° angle is the shortest and can be denoted as x.
- The side opposite the 60° angle is $x\sqrt{3}$.
- The hypotenuse is $2x$.

Example: If the side opposite the 30° angle is 4 units, the lengths of the other sides can be calculated as follows:

- Side opposite 60° = $4\sqrt{3} \approx 6.93$ units
- Hypotenuse = $2 \times 4 = 8$ units.

Mixed Practice Worksheets

Mixed practice worksheets typically feature a variety of problems that require students to apply their knowledge of special right triangles in different contexts. Here are some common types of problems you might find on such worksheets:

Types of Problems

1. Finding Side Lengths: Given one or two side lengths, determine the remaining side lengths.
2. Finding Angles: Using trigonometric ratios to find unknown angles in the triangle.
3. Application Problems: Real-world problems that require the application of special right triangle properties.
4. Word Problems: Problems presented in a narrative form that require interpretation and application of triangle properties.

Sample Problems and Answers

Below are sample problems from mixed practice worksheets along with their answers and explanations.

Problem 1: 45-45-90 Triangle

Question: In a 45-45-90 triangle, the length of each leg is 6 units. What is the length of the hypotenuse?

Answer:
- Hypotenuse = $6\sqrt{2} \approx 8.49$ units.

Explanation: Since both legs are equal, we apply the formula for the hypotenuse of a 45-45-90 triangle, which is the leg length multiplied by $\sqrt{2}$.

Problem 2: 30-60-90 Triangle

Question: In a 30-60-90 triangle, the hypotenuse measures 10 units. What are the lengths of the other two sides?

Answer:
- Side opposite 30° = $10 / 2 = 5$ units.
- Side opposite 60° = $5\sqrt{3} \approx 8.66$ units.

Explanation: The hypotenuse is twice the length of the side opposite the 30° angle, and the side opposite the 60° angle can be calculated using the relationship $x\sqrt{3}$.

Problem 3: Mixed Application Problem

Question: A ladder leans against a wall, forming a 30-60-90 triangle with the ground. If the foot of the ladder is 4 feet away from the wall, how high does the ladder reach on the wall?

Answer:
- Side opposite 30° (distance from the wall) = 4 feet.
- Side opposite 60° (height on the wall) = \(4\sqrt{3} \approx 6.93\) feet.

Explanation: Since the side opposite the 30° angle is given, we can use the special triangle properties to find the height by multiplying the base by \(\sqrt{3}\).

Problem 4: Word Problem

Question: A triangular park is designed in the shape of a 30-60-90 triangle. If the shortest side measures 3 meters, what are the lengths of the other two sides?

Answer:
- Length of the side opposite 60° = \(3\sqrt{3} \approx 5.20\) meters.
- Length of the hypotenuse = \(2 \times 3 = 6\) meters.

Explanation: Knowing the length of the side opposite the 30° angle allows us to apply the special triangle properties to find the other two sides.

Conclusion

Special right triangles, specifically the 45-45-90 and 30-60-90 triangles, form the basis for many geometric concepts and applications. Mixed practice worksheets provide an excellent platform for students to test their understanding and improve their problem-solving skills. By familiarizing themselves with the properties of these triangles and practicing with a variety of problems, students can build a strong foundation in geometry that will serve them well in future mathematical endeavors.

Ultimately, the comprehensive understanding of special right triangles and the ability to solve related problems is crucial for success in geometry and beyond. Whether working through sample problems or tackling real-world applications, mastering these concepts is an invaluable skill for any student.

Frequently Asked Questions

What are special right triangles and why are they important in geometry?

Special right triangles, specifically the 45-45-90 and 30-60-90 triangles, have consistent side ratios that simplify calculations and problem-solving in geometry, allowing for easier determination of unknown side lengths.

How do you find the side lengths of a 45-45-90 triangle?

In a 45-45-90 triangle, the lengths of the legs are equal, and the hypotenuse is the length of a leg multiplied by √2. If each leg is 'x', then the hypotenuse is 'x√2'.

What is the ratio of the sides in a 30-60-90 triangle?

In a 30-60-90 triangle, the ratio of the lengths of the sides opposite the 30°, 60°, and 90° angles is 1:√3:2. If the shortest side (opposite the 30° angle) is 'x', then the other sides are 'x√3' (opposite the 60° angle) and '2x' (the hypotenuse).

What types of problems can be solved using special right triangles?

Problems involving distances, heights, and angles in various geometric figures can be solved using special right triangles, particularly in real-world applications such as architecture, engineering, and trigonometry.

How can a mixed practice worksheet help with understanding special right triangles?

A mixed practice worksheet provides a variety of problems that reinforce the properties and calculations related to special right triangles, helping students apply their knowledge in different contexts and enhancing their problem-solving skills.

Where can I find reliable answers for special right triangles mixed practice worksheets?

Reliable answers for special right triangles mixed practice worksheets can often be found in math textbooks, educational websites like Khan Academy or MathIsFun, or through online math forums where educators and students share solutions.

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