

lesson 57 practice a the pythagorean theorem answer key

Lesson 57 Practice: The Pythagorean Theorem Answer Key is an essential resource for students learning about this fundamental concept in geometry. The Pythagorean Theorem, $a^2 + b^2 = c^2$, is critical for understanding relationships in right-angled triangles. In this article, we will delve into the theorem's principles, its applications, and provide a comprehensive answer key for practice problems associated with Lesson 57.

Understanding the Pythagorean Theorem

The Pythagorean Theorem relates the lengths of the sides of a right triangle. It states that:

- a and b are the lengths of the two legs (the sides that form the right angle).
- c is the length of the hypotenuse (the side opposite the right angle).

This theorem allows us to calculate the length of one side of a triangle if the lengths of the other two sides are known.

Components of the Theorem

1. Right Triangle: A triangle where one angle measures 90 degrees.
2. Legs: The two sides that form the right angle.
3. Hypotenuse: The longest side of the triangle, opposite the right angle.

Applications of the Pythagorean Theorem

The Pythagorean Theorem is not just an abstract mathematical concept; it has practical applications in various fields, including:

- Construction: Ensuring structures are level and square.
- Navigation: Calculating distances between points on a map.
- Computer Graphics: Determining distances and angles in digital environments.
- Physics: Solving problems involving forces and motion in two dimensions.

Practice Problems for Lesson 57

To reinforce understanding of the Pythagorean Theorem, students often engage with various practice problems. Here, we will outline a set of problems typically found in Lesson 57, followed by their answer key.

Sample Problems

1. Problem 1: A right triangle has legs measuring 6 cm and 8 cm. What is the length of the hypotenuse?
2. Problem 2: The hypotenuse of a right triangle measures 10 m, and one leg measures 6 m. Find the length of the other leg.
3. Problem 3: A ladder is leaning against a wall, forming a right triangle with the ground. If the base of the ladder is 4 ft from the wall and the ladder is 5 ft long, how high does it reach on the wall?
4. Problem 4: The lengths of the two legs of a right triangle are equal. If one leg measures x , express the length of the hypotenuse in terms of x .
5. Problem 5: A rectangular park has a diagonal path that measures 15 m. If one side of the park is 9 m long, find the length of the other side.

Answer Key for Lesson 57 Practice Problems

Now, let's provide detailed solutions to the practice problems outlined above.

Solutions

1. Solution to Problem 1:

- Given: $a = 6$ cm, $b = 8$ cm

- Using the Pythagorean Theorem:

$$\begin{aligned}c^2 &= a^2 + b^2 \\c^2 &= 6^2 + 8^2 \\c^2 &= 36 + 64 \\c^2 &= 100 \\c &= \sqrt{100} \\c &= 10 \text{ cm}\end{aligned}$$

- Answer: The hypotenuse is 10 cm.

2. Solution to Problem 2:

- Given: $c = 10$ m, $a = 6$ m

- Using the Pythagorean Theorem:

$$\begin{aligned}b^2 &= c^2 - a^2 \\b^2 &= 10^2 - 6^2 \\b^2 &= 100 - 36 \\b^2 &= 64 \\b &= \sqrt{64} \\b &= 8 \text{ m}\end{aligned}$$

\]

- Answer: The other leg is 8 m.

3. Solution to Problem 3:

- Given: base = 4 ft, hypotenuse = 5 ft

- Using the Pythagorean Theorem:

\[

$$h^2 = c^2 - a^2 \quad \backslash \backslash$$

$$h^2 = 5^2 - 4^2 \quad \backslash \backslash$$

$$h^2 = 25 - 16 \quad \backslash \backslash$$

$$h^2 = 9 \quad \backslash \backslash$$

$$h = \sqrt{9} \quad \backslash \backslash$$

$$h = 3 \text{ ft}$$

\]

- Answer: The ladder reaches 3 ft up the wall.

4. Solution to Problem 4:

- Given: $a = x$, $b = x$

- Using the Pythagorean Theorem:

\[

$$c^2 = a^2 + b^2 \quad \backslash \backslash$$

$$c^2 = x^2 + x^2 \quad \backslash \backslash$$

$$c^2 = 2x^2 \quad \backslash \backslash$$

$$c = \sqrt{2}x$$

\]

- Answer: The hypotenuse is $(\sqrt{2}x)$.

5. Solution to Problem 5:

- Given: diagonal (c) = 15 m, one side (a) = 9 m

- Using the Pythagorean Theorem:

\[

$$b^2 = c^2 - a^2 \quad \backslash \backslash$$

$$b^2 = 15^2 - 9^2 \quad \backslash \backslash$$

$$b^2 = 225 - 81 \quad \backslash \backslash$$

$$b^2 = 144 \quad \backslash \backslash$$

$$b = \sqrt{144} \quad \backslash \backslash$$

$$b = 12 \text{ m}$$

\]

- Answer: The other side is 12 m.

Conclusion

Lesson 57 Practice: The Pythagorean Theorem Answer Key provides valuable insights into solving problems related to right triangles. Mastering the theorem not only equips students with essential mathematical skills but also prepares them for real-world applications. Understanding how to apply $a^2 + b^2 = c^2$ is crucial for success in geometry and various practical fields. By practicing with problems and reviewing the answers, students can solidify their grasp of this important mathematical concept.

Frequently Asked Questions

What is the Pythagorean theorem and how is it used in lesson 57?

The Pythagorean theorem states that in a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides. In lesson 57, this theorem is applied to solve problems involving right triangles, helping students practice identifying the sides and calculating unknown lengths.

What types of problems are typically included in the practice section of lesson 57?

The practice section of lesson 57 typically includes problems where students are required to find the length of one side of a right triangle given the lengths of the other two sides, as well as word problems that contextualize the use of the Pythagorean theorem in real-life scenarios.

How can students check their answers for the Pythagorean theorem problems in lesson 57?

Students can check their answers by substituting the values they calculated back into the Pythagorean theorem formula ($a^2 + b^2 = c^2$) to ensure that the equation holds true. Additionally, they can refer to the answer key provided at the end of the lesson.

What common mistakes should students watch out for when solving lesson 57 problems?

Common mistakes include misidentifying the hypotenuse, incorrectly applying the Pythagorean theorem, and making calculation errors when squaring the sides or taking square roots. Students should carefully label their triangles and double-check their arithmetic.

Why is it important to master the Pythagorean theorem as covered in lesson 57?

Mastering the Pythagorean theorem is crucial because it serves as a fundamental concept in geometry that is widely applicable in various fields, including architecture, engineering, and physics. Additionally, understanding this theorem lays the groundwork for more advanced mathematical concepts.

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