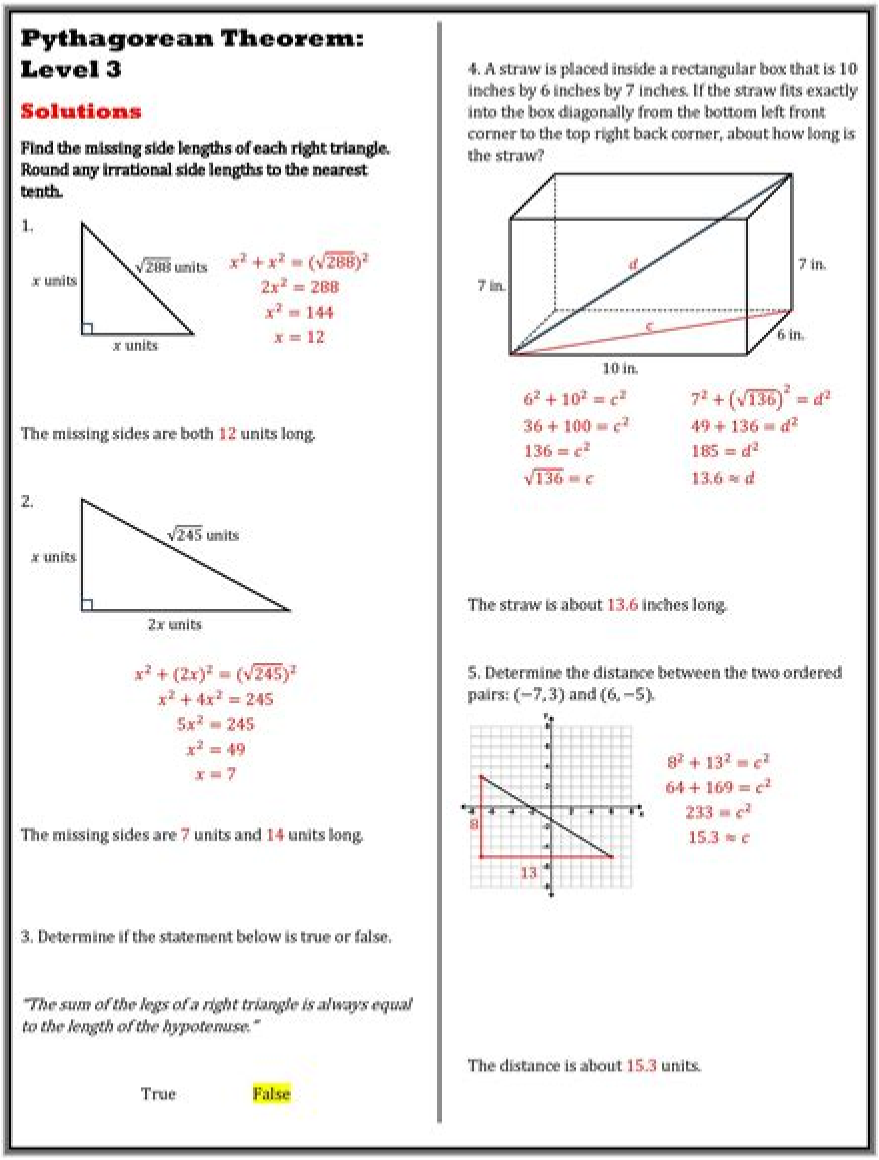
Lesson 57 Practice A The Pythagorean Theorem Answers



x units
$\sqrt{288}$ units
x units
x units
$\sqrt{245}$ units
2x units
7 in.
d
7 in.
c
6 in.
10 in.
8
13

Pythagorean Theorem: Level 3

Solutions

Find the missing side lengths of each right triangle. Round any irrational side lengths to the nearest tenth.

1.

$$x^2 + x^2 = (\sqrt{288})^2$$
$$2x^2 = 288$$
$$x^2 = 144$$
$$x = 12$$

The missing sides are both 12 units long.

2.

$$x^2 + (2x)^2 = (\sqrt{245})^2$$
$$x^2 + 4x^2 = 245$$
$$5x^2 = 245$$
$$x^2 = 49$$
$$x = 7$$

The missing sides are 7 units and 14 units long.

3. Determine if the statement below is true or false.

"The sum of the legs of a right triangle is always equal to the length of the hypotenuse."

True [✓ False]

4. A straw is placed inside a rectangular box that is 10 inches by 6 inches by 7 inches. If the straw fits exactly into the box diagonally from the bottom left front corner to the top right back corner, about how long is the straw?

$$6^2 + 10^2 = c^2$$
$$36 + 100 = c^2$$
$$136 = c^2$$
$$\sqrt{136} = c$$

$$7^2 + \left(\sqrt{136}\right)^2 = d^2$$
$$49 + 136 = d^2$$
$$185 = d^2$$
$$13.6 \approx d$$

The straw is about 13.6 inches long.

5. Determine the distance between the two ordered pairs: $(-7, 3)$ and $(6, -5)$.

$$8^2 + 13^2 = c^2$$
$$64 + 169 = c^2$$
$$233 = c^2$$
$$15.3 \approx c$$

The distance is about 15.3 units.

Lesson 57 practice a the Pythagorean theorem answers are essential for students mastering the fundamentals of geometry. The Pythagorean theorem is a cornerstone of mathematical education, providing a method to calculate the lengths of sides in right-angled triangles. This article will delve into the Pythagorean theorem, its applications, and how to effectively approach practice problems, including the answers to common exercises found in Lesson 57.

Understanding the Pythagorean Theorem

The Pythagorean theorem states that in a right-angled triangle, the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the lengths of the other two sides. This relationship can be expressed with the formula:

$$ a^2 + b^2 = c^2 $$

Where:
- c represents the length of the hypotenuse,
- a and b represent the lengths of the other two sides.

Applications of the Pythagorean Theorem

The Pythagorean theorem is widely used in various fields, including:

- **Architecture:** Ensuring that structures are built at right angles.
- **Navigation:** Calculating the shortest distance between two points.
- **Computer Graphics:** Determining distances in pixel-based environments.
- **Sports:** Analyzing distances in various athletic activities.

Common Practice Problems in Lesson 57

In many math textbooks, including those used in Lesson 57, students encounter practice problems that require them to apply the Pythagorean theorem. Here are some typical examples, along with their solutions.

Example Problems

1. Find the length of the hypotenuse.
- Given: $a = 3$ and $b = 4$
- Solution:

$$
c^2 = a^2 + b^2 = 3^2 + 4^2 = 9 + 16 = 25 \implies c = \sqrt{25} = 5
$$

2. Find the length of a side.
- Given: $c = 10$ and $b = 6$
- Solution:

$$
a^2 = c^2 - b^2 = 10^2 - 6^2 = 100 - 36 = 64 \implies a = \sqrt{64} = 8
$$

3. A ladder leans against a wall. If the base of the ladder is 4 feet from the wall and the ladder is 10 feet long, how high up the wall does the ladder reach?
- Given: $c = 10$ and $a = 4$
- Solution:

$$
b^2 = c^2 - a^2 = 10^2 - 4^2 = 100 - 16 = 84 \implies b = \sqrt{84} \approx 9.17 \text{ feet}
$$

Tips for Solving Pythagorean Theorem Problems

Students often encounter challenges when applying the Pythagorean theorem. Here are some helpful tips:

Identify the Right Triangle

Always ensure that the triangle you are working with is a right triangle. Look for a 90-degree angle, which is crucial for applying the theorem.

Label the Sides

Label the sides of the triangle as a, b, and c clearly. Remember that c is always the hypotenuse.

Practice with Different Problems

The best way to master the Pythagorean theorem is through practice. Work on various types of problems, including those that require finding the hypotenuse and those that require finding a missing leg.

Use Visual Aids

Drawing the triangles can help visualize the problem. Sketch the triangle and label the sides based on the given information.

Check Your Work

After solving a problem, plug your answer back into the Pythagorean theorem to verify that it holds true.

Lesson 57 Practice A Answers

While specific answers to Lesson 57 practice problems will vary by textbook, here are some common solutions based on the examples provided earlier:

- Problem 1: Hypotenuse = 5
- Problem 2: Side \(a \) = 8
- Problem 3: Height up the wall = 9.17 feet

Students should always refer to their specific textbooks to ensure their answers align with those provided in their lessons.

Conclusion

Mastering the Pythagorean theorem is crucial for students studying geometry. By understanding the theorem's principles, practicing various problems, and utilizing helpful strategies, students can enhance their problem-solving skills. Remember, the answers to Lesson 57 practice a the Pythagorean theorem are not just numbers; they represent an essential concept in mathematics that has real-world applications. Keep practicing, and soon you'll find confidence in tackling these problems with ease!

Frequently Asked Questions

What is the Pythagorean theorem?

The Pythagorean theorem states that in a right triangle, the square of the length of the hypotenuse (c) is equal to the sum of the squares of the lengths of the other two sides (a and b), expressed as $a^2 + b^2 = c^2$.

How can I apply the Pythagorean theorem to find the length of a side?

To find the length of a side in a right triangle using the Pythagorean theorem, you can rearrange the formula. For example, if you know the lengths of sides a and b, you can find c by calculating $c = \sqrt{(a^2 + b^2)}$. If you need to find a or b, rearrange it accordingly: $a = \sqrt{(c^2 - b^2)}$ or $b = \sqrt{(c^2 - a^2)}$.

What types of problems can be solved using the

Pythagorean theorem?

The Pythagorean theorem can be used to solve various types of problems including finding the lengths of sides in right triangles, determining distances in coordinate geometry, and solving real-world problems involving heights, lengths, and diagonal distances.

What are some common mistakes when using the Pythagorean theorem?

Common mistakes include incorrectly identifying which sides are a and b versus the hypotenuse, miscalculating the squares of the lengths, and failing to ensure the triangle is a right triangle before applying the theorem.

How does the Pythagorean theorem relate to the distance formula?

The Pythagorean theorem is the foundation of the distance formula used in coordinate geometry. The distance d between two points (x1, y1) and (x2, y2) can be calculated as $d = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$, which is derived from the Pythagorean theorem.

Can the Pythagorean theorem be used for non-right triangles?

No, the Pythagorean theorem only applies to right triangles. However, for non-right triangles, other methods such as the Law of Cosines can be used to relate the lengths of the sides.

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