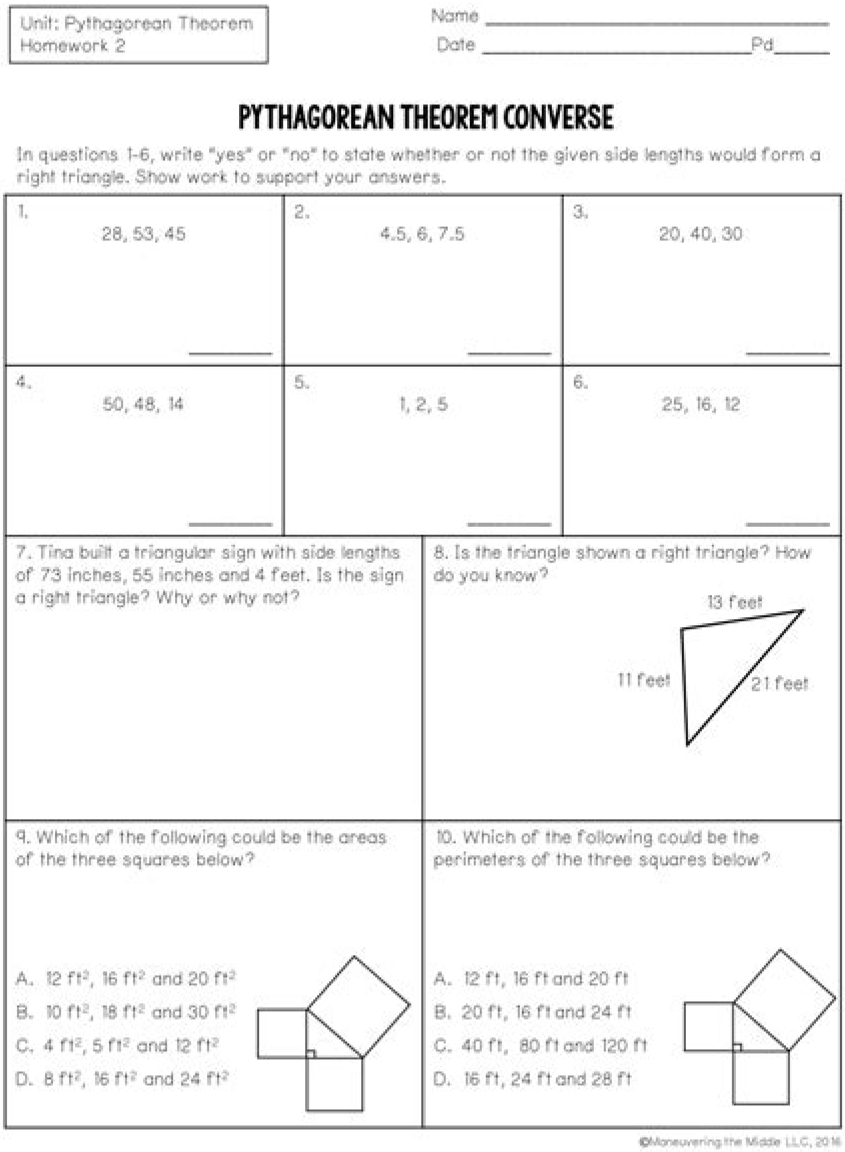
Unit Pythagorean Theorem Homework 2 Answer Key



Unit: Pythagorean Theorem
Homework 2

Name ______________________
Date ____________________Pd_____

PYTHAGOREAN THEOREM CONVERSE

In questions 1-6, write "yes" or "no" to state whether or not the given side lengths would form a right triangle. Show work to support your answers.

1. 28, 53, 45 ______
2. 4.5, 6, 7.5 ______
3. 20, 40, 30 ______
4. 50, 48, 14 ______
5. 1, 2, 5 ______
6. 25, 16, 12 ______

7. Tina built a triangular sign with side lengths of 73 inches, 55 inches and 4 feet. Is the sign a right triangle? Why or why not?

8. Is the triangle shown a right triangle? How do you know?

9. Which of the following could be the areas of the three squares below?

A. 12 ft^2, 16 ft^2 and 20 ft^2
B. 10 ft^2, 18 ft^2 and 30 ft^2
C. 4 ft^2, 5 ft^2 and 12 ft^2
D. 8 ft^2, 16 ft^2 and 24 ft^2

10. Which of the following could be the perimeters of the three squares below?

A. 12 ft, 16 ft and 20 ft
B. 20 ft, 16 ft and 24 ft
C. 40 ft, 80 ft and 120 ft
D. 16 ft, 24 ft and 28 ft

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The Pythagorean Theorem is a fundamental principle in geometry that establishes a relationship between the sides of a right triangle. It is expressed with the formula $a^2 + b^2 = c^2$, where c represents the length of the hypotenuse (the side opposite the right angle), and a and b represent the lengths of the other two sides. This article will delve into the Pythagorean Theorem, provide methods for solving related homework problems, and ultimately present a comprehensive answer key for the Unit Pythagorean Theorem Homework 2.

Understanding the Pythagorean Theorem

Definition and Components

The Pythagorean Theorem is not only a vital tool in geometry but also in various real-world applications such as architecture, navigation, and physics. To fully grasp the theorem, it is essential to understand its components:

- Right Triangle: A triangle with one angle measuring 90 degrees.
- Hypotenuse: The longest side of a right triangle, opposite the right angle.
- Legs: The two sides that form the right angle.

The Formula

The Pythagorean Theorem can be mathematically expressed as:

\[
a^2 + b^2 = c^2
\]

Where:
- \(a\) and \(b\) are the lengths of the legs of the triangle.
- \(c\) is the length of the hypotenuse.

Applications of the Pythagorean Theorem

The theorem is applicable in numerous fields, and its utility extends beyond theoretical mathematics. Here are some common applications:

1. Architecture: Ensuring structures are built with correct angles.
2. Navigation: Calculating shortest paths on maps.
3. Construction: Determining dimensions and angles for building projects.
4. Physics: Analyzing forces and vectors.

Problem-Solving Strategies

When tackling problems related to the Pythagorean Theorem, students can follow these strategies:

Identifying Right Triangles

Before applying the theorem, ensure the triangle in question is a right triangle. Look for a 90-degree angle.

Labeling the Sides

Once confirmed, label the sides:
- Identify the hypotenuse (the longest side).
- Identify the legs (the two sides that create the right angle).

Applying the Formula

Use the Pythagorean Theorem formula \(a^2 + b^2 = c^2\) to solve for the unknown side. If solving for \(c\), rearrange the formula as:

\[

c = \sqrt{a^2 + b^2}
\]

If solving for one of the legs, rearrange accordingly:

\[
a = \sqrt{c^2 - b^2} \quad \text{or} \quad b = \sqrt{c^2 - a^2}
\]

Checking Your Work

After calculating, it’s good practice to verify your solution by substituting the values back into the Pythagorean theorem to ensure the equation holds true.

Example Problems and Solutions

To further illustrate the workings of the Pythagorean theorem, let’s look at some example problems that might appear in Unit Pythagorean Theorem Homework 2.

Problem 1: Find the Hypotenuse

Given: A right triangle with legs measuring 3 cm and 4 cm.

Solution:

1. Identify \(a = 3\) cm and \(b = 4\) cm.
2. Apply the formula:

\[
c = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5 \text{ cm}
\]

Problem 2: Find a Leg of the Triangle

Given: A right triangle with a hypotenuse of 10 cm and one leg measuring 6 cm.

Solution:

1. Identify \(c = 10\) cm and \(a = 6\) cm.
2. Rearrange the formula to find \(b\):

\[
b = \sqrt{c^2 - a^2} = \sqrt{10^2 - 6^2} = \sqrt{100 - 36} = \sqrt{64} = 8 \text{ cm}
\]

Problem 3: Validate a Right Triangle

Given: Sides measuring 5 cm, 12 cm, and 13 cm.

Solution:

1. Check if it forms a right triangle:

$$
5^2 + 12^2 = 13^2
$$
$$
25 + 144 = 169 \quad \text{(True)}
$$

Since both sides of the equation equal, it confirms that the triangle is indeed a right triangle.

Unit Pythagorean Theorem Homework 2 Answer Key

Here is a sample answer key to reference for Unit Pythagorean Theorem Homework 2. This key includes common types of problems that students may encounter.

Answers to Example Problems

1. Problem 1: Hypotenuse of 3 cm and 4 cm legs: 5 cm
2. Problem 2: Hypotenuse of 10 cm and one leg of 6 cm: 8 cm
3. Problem 3: Validate sides 5 cm, 12 cm, and 13 cm: Yes, it is a right triangle.

Sample Homework Answers

1. Find the hypotenuse of a triangle with legs 8 cm and 15 cm:
- Answer: 17 cm
2. Find one leg of a triangle with a hypotenuse of 13 cm and the other leg of 5 cm:
- Answer: 12 cm
3. Determine if the triangle is right with sides 9 cm, 12 cm, and 15 cm:
- Answer: Yes, it is a right triangle.

Conclusion

The Pythagorean Theorem is an essential mathematical principle that has widespread applications across various fields. By understanding the theorem and practicing problem-solving techniques, students can confidently tackle problems related to right triangles. The Unit Pythagorean Theorem Homework 2 Answer Key serves as a valuable resource for verifying answers and reinforcing understanding. As students engage with these concepts, they will develop a stronger foundation in geometry that will aid them in more advanced mathematical studies.

Frequently Asked Questions

What is the Pythagorean theorem?

The Pythagorean theorem states that in a right-angled 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. It can be expressed as $a^2 + b^2 = c^2$.

How can I find the missing side of a triangle using the Pythagorean theorem?

To find the missing side of a right triangle, rearrange the Pythagorean theorem formula. For example, if you know the lengths of the other two sides (a and b), you can find the hypotenuse (c) using $c = \sqrt{(a^2 + b^2)}$. If you know one leg and the hypotenuse, use $a = \sqrt{(c^2 - b^2)}$.

What types of problems are typically included in 'unit Pythagorean theorem homework 2'?

Unit Pythagorean theorem homework usually includes problems that require students to calculate the lengths of sides in right triangles, apply the theorem to real-life scenarios, and solve word problems involving right triangles.

Is there a way to check my answers for Pythagorean theorem homework?

Yes, you can check your answers by substituting the values back into the Pythagorean theorem formula. If the equation holds true ($a^2 + b^2 = c^2$), then your answer is correct. Additionally, many educational resources provide answer keys for homework.

What resources are available for studying the Pythagorean theorem?

There are numerous resources available for studying the Pythagorean theorem, including online tutorials, educational videos, homework help websites, and math textbooks. Websites like Khan Academy and YouTube offer step-by-step explanations and practice problems.

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

No, the Pythagorean theorem specifically applies to right triangles. However, it can be related to non-right triangles through the Law of Cosines, which can be used to find the lengths of sides in any triangle.

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