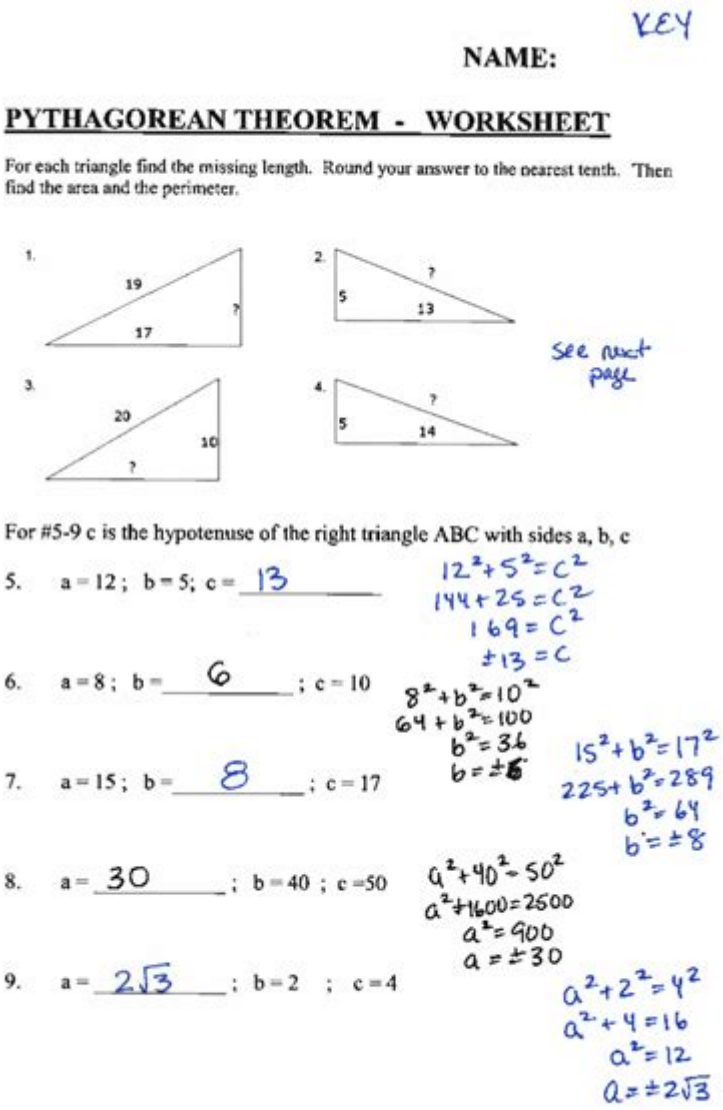
Pythagorean Theorem Worksheet With Answer Key



KEY

NAME:

PYTHAGOREAN THEOREM - WORKSHEET

For each triangle find the missing length. Round your answer to the nearest tenth. Then find the area and the perimeter.

1. 19, ?, 17

2. ?, 5, 13

see next page

3. 20, 10, ?

4. ?, 5, 14

For #5-9 c is the hypotenuse of the right triangle ABC with sides a, b, c

5. a = 12; b = 5; c = 13 $12^2+5^2=c^2$, $144+25=c^2$, $169=c^2$, $\pm 13=c$

6. a = 8; b = 6; c = 10 $8^2+b^2=10^2$, $64+b^2=100$, $b^2=36$, $b=\pm 6$

7. a = 15; b = 8; c = 17 $15^2+b^2=17^2$, $225+b^2=289$, $b^2=64$, $b=\pm 8$

8. a = 30; b = 40; c = 50 $a^2+40^2=50^2$, $a^2+1600=2500$, $a^2=900$, $a=\pm 30$

9. a = $2\sqrt{3}$; b = 2; c = 4 $a^2+2^2=4^2$, $a^2+4=16$, $a^2=12$, $a=\pm 2\sqrt{3}$

Pythagorean theorem worksheet with answer key is an essential educational tool for teachers and students alike, designed to reinforce understanding of one of the most fundamental concepts in geometry. The Pythagorean theorem, which states that in a right 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, is pivotal in various fields including mathematics, physics, engineering, and architecture. This article will explore the importance of the Pythagorean theorem, provide examples of worksheets, and present an answer key to help students check their work.

Understanding the Pythagorean Theorem

The Pythagorean theorem can be expressed mathematically as:

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

Where:
- $ c $ is the length of the hypotenuse,
- $ a $ and $ b $ are the lengths of the other two sides.

This theorem only applies to right triangles, which have one angle measuring 90 degrees. Understanding this theorem is crucial for solving problems that involve right triangles in various applications.

Applications of the Pythagorean Theorem

The Pythagorean theorem has numerous applications, including:

- **Construction:** Used to create right angles in building projects.
- **Navigation:** Helps in calculating direct distances between two points.
- **Physics:** Used in vector calculations and analyzing motion.
- **Computer Graphics:** Assists in creating realistic models and animations.

Understanding and applying the Pythagorean theorem is essential for students aspiring to enter these

fields.

Creating a Pythagorean Theorem Worksheet

A well-structured worksheet should include a variety of problems that require students to apply the Pythagorean theorem in different contexts. Here is an example of a worksheet that can be used in the classroom.

Pythagorean Theorem Worksheet

Instructions: Solve the following problems using the Pythagorean theorem. Show your work for full credit.

1. Find the length of the hypotenuse:
- a) A right triangle has legs of lengths 3 cm and 4 cm.
- b) A right triangle has legs of lengths 5 m and 12 m.
- c) A right triangle has legs of lengths 8 in and 15 in.

2. Find the length of a leg:
- a) A right triangle has a hypotenuse of 10 cm and one leg of 6 cm.
- b) A right triangle has a hypotenuse of 13 m and one leg of 5 m.
- c) A right triangle has a hypotenuse of 17 in and one leg of 15 in.

3. Word Problems:
- a) A ladder is leaning against a wall. The base of the ladder is 6 feet from the wall, and the top reaches 8 feet high. How long is the ladder?
- b) A park has a triangular section where one side is 9 meters long, another side is 12 meters long, and the angle between them is a right angle. What is the length of the diagonal path across the park?

4. Challenge Problem:

- A right triangle has a hypotenuse of length c and one leg of length a. If $c = 25$ and $a = 20$, what is the length of the other leg b?

Answer Key for the Pythagorean Theorem Worksheet

Providing an answer key is crucial for students to verify their solutions and understand any mistakes they may have made. The following is the answer key for the worksheet provided above.

Answers:

1. Find the length of the hypotenuse:

- a) $c = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5$ cm
- b) $c = \sqrt{5^2 + 12^2} = \sqrt{25 + 144} = \sqrt{169} = 13$ m
- c) $c = \sqrt{8^2 + 15^2} = \sqrt{64 + 225} = \sqrt{289} = 17$ in

2. Find the length of a leg:

- a) $b = \sqrt{10^2 - 6^2} = \sqrt{100 - 36} = \sqrt{64} = 8$ cm
- b) $b = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$ m
- c) $b = \sqrt{17^2 - 15^2} = \sqrt{289 - 225} = \sqrt{64} = 8$ in

3. Word Problems:

- a) Length of the ladder $c = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$ feet
- b) Length of the diagonal path $c = \sqrt{9^2 + 12^2} = \sqrt{81 + 144} = \sqrt{225} = 15$ meters

4. Challenge Problem:

- $b = \sqrt{25^2 - 20^2} = \sqrt{625 - 400} = \sqrt{225} = 15$

Conclusion

The Pythagorean theorem worksheet with answer key serves as a valuable resource for both educators and students. It caters to different learning styles by incorporating a variety of problem types, including numerical calculations and real-world applications. By practicing with such worksheets, students can develop a strong grasp of the Pythagorean theorem, which will serve them well in future mathematical endeavors.

Encouraging students to show their work while solving these problems not only reinforces the learning process but also helps teachers identify areas where students may need additional support. Overall, mastering the Pythagorean theorem through structured practice is a key step toward becoming proficient in geometry and its applications.

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 is equal to the sum of the squares of the lengths of the other two sides. It is expressed as $a^2 + b^2 = c^2$.

What types of problems can be found on a Pythagorean theorem worksheet?

A Pythagorean theorem worksheet typically includes problems such as finding the length of a side in a right triangle, word problems involving real-life scenarios, and identifying whether a triangle is a right triangle based on side lengths.

How can I create a Pythagorean theorem worksheet?

You can create a Pythagorean theorem worksheet by including a variety of problems that require

students to apply the theorem, along with space for calculations. You can use online resources, math textbooks, or create your own problems based on the theorem.

What is an answer key, and why is it important for a worksheet?

An answer key is a guide that provides the correct answers to the problems on a worksheet. It is important because it allows students to check their work, helps teachers grade assignments efficiently, and provides instant feedback.

Where can I find Pythagorean theorem worksheets with answer keys?

Pythagorean theorem worksheets with answer keys can be found on educational websites, teacher resource sites, and math-focused platforms. Websites like Teachers Pay Teachers, Education.com, or Math-Aids.com often provide free and paid resources.

What are some common mistakes students make when solving Pythagorean theorem problems?

Common mistakes include misidentifying the hypotenuse, incorrectly applying the theorem, failing to simplify answers, and overlooking the importance of units in word problems.

How can teachers assess students' understanding of the Pythagorean theorem using worksheets?

Teachers can assess understanding by reviewing students' work on the worksheets, checking for correct application of the theorem, evaluating problem-solving strategies, and providing feedback based on their calculations and reasoning.

What are some tips for solving Pythagorean theorem problems effectively?

To solve Pythagorean theorem problems effectively, always identify which side is the hypotenuse, carefully set up the equation $a^2 + b^2 = c^2$, double-check calculations, and practice with a variety of

problems to build confidence.

Pythagorean Theorem Worksheet With Answer Key

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