

Pythagorean Word Problems Worksheet With Answers

Name _____ Date _____

Pythagorean Theorem Word Problems- Matching Worksheet

Write the letter of the answer that matches the problem.

_____ 1. Daniel rides his bicycle 21 km west and then 18 km north. How far is he from his starting point?	a. 11.7 cm
_____ 2. A square is put together by two triangles. The hypotenuse is 11 cm and width of 8 cm. Find the height of the triangle.	b. 20.6 cm
_____ 3. Find the hypotenuse of a triangle that has a 13 cm leg and a height of 7 cm.	c. 7.55 cm
_____ 4. In a right-triangle shaped house, the roof is 51 feet long and the base of the house is 29 feet across. Calculate the height of the house.	d. 13.1 feet
_____ 5. John is trying to determine the length of the staircase he will need for a deck that is 12 feet high. He wants to start the stairs 21 feet from the deck.	e. 42 feet
_____ 6. A triangle shaped paper's height is 18 cm and width is 10 cm. Find the hypotenuse of the paper.	f. 27.7 km
_____ 7. Find the hypotenuse of a triangle that has an 8 cm width and a height of 12 cm.	g. 24.2 feet
_____ 8. The bottom of a ladder must be placed 5 feet from a building. The ladder is 14 feet long. How far above the ground does the ladder touch the wall?	h. 14.4 cm
_____ 9. Find the width of a triangle that has a 15 cm height and a hypotenuse of 19 cm.	i. 14.8 cm

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Pythagorean Word Problems Worksheet with Answers: Master the Theorem

Are you struggling with Pythagorean theorem word problems? Do you need a resource that provides not just the problems but also the detailed, step-by-step solutions? Then you've landed in the right place! This comprehensive guide offers a Pythagorean word problems worksheet with answers, designed to help you master this fundamental concept in geometry. We'll break down the challenges, provide practical examples, and equip you with the skills to confidently tackle any Pythagorean word problem.

Understanding the Pythagorean Theorem

Before diving into the worksheet, let's refresh our understanding of the Pythagorean Theorem itself. This theorem applies specifically to right-angled triangles (triangles with one 90-degree angle). It states that the square of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides (called legs or cathetus). Mathematically, this is represented as:

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

where:

a and b are the lengths of the legs of the right-angled triangle.
c is the length of the hypotenuse.

Identifying the Hypotenuse

The first and often most crucial step in solving Pythagorean word problems is correctly identifying the hypotenuse. Remember, it's always the longest side and is opposite the right angle. Misidentifying the hypotenuse will lead to incorrect calculations.

Pythagorean Word Problems Worksheet

Now, let's get to the core of this guide - the worksheet! Each problem below is followed by a detailed solution. Try solving them on your own first before checking the answers.

Problem 1: A ladder 10 meters long leans against a wall. The base of the ladder is 6 meters from the wall. How high up the wall does the ladder reach?

Solution 1: Here, the ladder is the hypotenuse ($c = 10\text{m}$), the distance from the wall is one leg ($a = 6\text{m}$), and the height up the wall is the other leg (b). Using the Pythagorean theorem:

$$6^2 + b^2 = 10^2$$

$$36 + b^2 = 100$$

$$b^2 = 64$$

$$b = 8 \text{ meters}$$

The ladder reaches 8 meters up the wall.

Problem 2: A rectangular garden is 12 meters long and 9 meters wide. What is the length of the diagonal path across the garden?

Solution 2: The diagonal forms the hypotenuse of a right-angled triangle with legs of 12 meters and 9 meters.

$$12^2 + 9^2 = c^2$$

$$144 + 81 = c^2$$

$$c^2 = 225$$

$$c = 15 \text{ meters}$$

The diagonal path is 15 meters long.

Problem 3: A bird flies 5 km due east, then 12 km due north. How far is the bird from its starting point?

Solution 3: This forms a right-angled triangle. The east and north distances are the legs ($a = 5\text{km}$, $b = 12\text{km}$), and the distance from the starting point is the hypotenuse (c).

$$5^2 + 12^2 = c^2$$

$$25 + 144 = c^2$$

$$c^2 = 169$$

$$c = 13 \text{ km}$$

The bird is 13 km from its starting point.

Problem 4: Two ships leave a port at the same time. One travels 20 km due south, and the other travels 48 km due east. How far apart are the ships?

Solution 4: Similar to Problem 3, this forms a right-angled triangle. The south and east distances are the legs, and the distance between the ships is the hypotenuse.

$$20^2 + 48^2 = c^2$$

$$400 + 2304 = c^2$$

$$c^2 = 2704$$

$$c = 52 \text{ km}$$

The ships are 52 km apart.

Tips for Solving Pythagorean Word Problems

Draw a diagram: Always start by drawing a diagram to visualize the right-angled triangle. This helps clarify which side is the hypotenuse and which are the legs.

Label the sides: Clearly label the sides of the triangle with the given information (lengths).

Choose the correct formula: Use the formula $a^2 + b^2 = c^2$ and substitute the known values.

Solve for the unknown: Solve the equation algebraically to find the length of the unknown side.

Check your answer: Ensure your answer makes sense in the context of the problem.

Conclusion

Mastering Pythagorean word problems requires practice and a solid understanding of the theorem. By working through this worksheet and following the provided solutions, you'll build your confidence and improve your problem-solving skills. Remember to always visualize the problem with a diagram and carefully identify the hypotenuse. Keep practicing, and you'll soon be tackling these problems with ease!

FAQs

1. What if I get a negative number when solving for a side length? This indicates an error in your calculations. Side lengths cannot be negative. Double-check your work, particularly your identification of the hypotenuse.
2. Can the Pythagorean theorem be used on triangles that aren't right-angled? No, the Pythagorean theorem only applies to right-angled triangles. Other methods are needed for other types of triangles.
3. Are there any real-world applications of the Pythagorean theorem besides the examples provided? Yes, many! It's used in construction, navigation, surveying, and even computer graphics.
4. What if the problem involves decimals or fractions? The same principles apply. Just be careful with your calculations and use a calculator if necessary.
5. Where can I find more practice problems? Numerous online resources and textbooks offer additional Pythagorean theorem word problems with solutions. Search for "Pythagorean theorem practice problems" online.

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selection of articles written by Erich Ch. Wittmann between 1984 to 2019, which shows how the “design science conception” has been continuously developed over a number of decades. The articles not only describe this conception in general terms, but also demonstrate various substantial learning environments that serve as typical examples. In terms of teacher education, the book provides clear information on how to combine (well-understood) mathematics and methods courses to benefit of teachers. The role of mathematics in mathematics education is often explicitly and implicitly reduced to the delivery of subject matter that then has to be selected and made palpable for students using methods imported from psychology, sociology, educational research and related disciplines. While these fields have made significant contributions to mathematics education in recent decades, it cannot be ignored that mathematics itself, if well understood, provides essential knowledge for teaching mathematics beyond the pure delivery of subject matter. For this purpose, mathematics has to be conceived of as an organism that is deeply rooted in elementary operations of the human mind, which can be seamlessly developed to higher and higher levels so that the full richness of problems of various degrees of difficulty, and different means of representation, problem-solving strategies, and forms of proof can be used in ways that are appropriate for the respective level. This view of mathematics is essential for designing learning environments and curricula, for conducting empirical studies on truly mathematical processes and also for implementing the findings of mathematics education in teacher education, where it is crucial to take systemic constraints into account.

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Intro to the Pythagorean theorem (video) | Khan Academy

The Pythagorean theorem is a cornerstone of math that helps us find the missing side length of a right triangle. In a right triangle with sides A, B, and hypotenuse C, the theorem states that $A^2 + B^2 = C^2$. The hypotenuse is the longest side, opposite the right angle.

Pythagorean theorem - Encyclopedia of Mathematics

Dec 17, 2016 · Also known as Pythagoras' theorem, the Pythagorean theorem is a theorem in

geometry that gives a relationship between the sides of a right-angled triangle. The Pythagorean theorem was evidently known before Pythagoras (6th century B.C.), but the proof in general form is ascribed to him.

Pythagorean (Pythagoras) Theorem - Definition, Formula,

Jun 8, 2024 · The Pythagorean Theorem, also known as Pythagoras theorem is a mathematical relation between the 3 sides of a right triangle, a triangle in which one of 3 angles is 90° .

What is the Pythagorean Theorem? How does it work?

Back when you first studied square roots and how to solve radical equations, you were probably introduced to something called "the Pythagorean Theorem". This Theorem relates the lengths of the three sides of any right triangle.

Pythagoreanism - Wikipedia

Pythagorean philosophers believed that there was a close relationship between numbers and geometrical forms. Early-Pythagorean philosophers proved simple geometrical theorems, including "the sum of the angles of a triangle equals two right angles".

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