

example of geometry problem with solution

Example of a geometry problem with solution is a fundamental aspect of mathematics that helps students and enthusiasts alike to understand spatial relationships and properties of shapes. Geometry problems can range from simple calculations involving area and perimeter to complex theorems involving angles and circles. In this article, we will explore a specific geometry problem, break it down step by step, and provide a thorough solution to enhance comprehension.

Understanding the Problem

To illustrate a geometry problem, let's consider a classic scenario involving a triangle. Here's the problem:

Problem Statement:

A triangle has sides of lengths 7 cm, 24 cm, and 25 cm. Determine whether this triangle is a right triangle, and if so, find the area of the triangle.

Step-by-Step Solution

To solve this problem, we will follow a systematic approach.

Step 1: Identify the Type of Triangle

A triangle is classified as a right triangle if it satisfies the Pythagorean theorem, which states that in a right triangle, the square of the length of the hypotenuse (the longest side) is equal to the sum of the squares of the other two sides.

In our case, the sides of the triangle are:

- $a = 7$ cm
- $b = 24$ cm
- $c = 25$ cm (the longest side)

According to the Pythagorean theorem:

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

Let's compute it:

1. Calculate c^2 :

$$c^2 = 25^2 = 625$$

2. Calculate $(a^2 + b^2)$:

$$a^2 + b^2 = 7^2 + 24^2 = 49 + 576 = 625$$

Since $(c^2 = a^2 + b^2)$, we can conclude that the triangle is indeed a right triangle.

Step 2: Finding the Area of the Triangle

The area (A) of a right triangle can be calculated using the formula:

$$A = \frac{1}{2} \times \text{base} \times \text{height}$$

In our triangle, we can take the legs (a) and (b) as the base and height, respectively.

Substituting the values:

$$A = \frac{1}{2} \times 7 \text{ cm} \times 24 \text{ cm}$$

Calculating the area gives:

$$A = \frac{1}{2} \times 168 \text{ cm}^2 = 84 \text{ cm}^2$$

Thus, the area of the triangle is (84 cm^2) .

Conclusion

In this article, we examined an example of a geometry problem involving a triangle and demonstrated how to determine if it is a right triangle while calculating its area. To summarize:

- We established that the triangle with sides 7 cm, 24 cm, and 25 cm is a right triangle using the Pythagorean theorem.
- We calculated its area to be 84 cm².

This example showcases the process of solving a geometry problem step by step, reinforcing the importance of understanding geometric principles and their applications. Whether you are a student preparing for an exam or simply curious about geometry, practicing similar problems will strengthen your skills and confidence in mathematics.

Frequently Asked Questions

What is an example of a basic geometry problem involving a triangle?

Find the area of a triangle with a base of 10 units and a height of 5 units. Solution: $\text{Area} = 0.5 \text{ base height} = 0.5 \cdot 10 \cdot 5 = 25$ square units.

How do you solve for the circumference of a circle?

Given a circle with a radius of 7 units, the circumference can be calculated using the formula $C = 2\pi r$. Solution: $C = 2 \pi 7 \approx 43.98$ units.

What is an example of a geometry problem involving the Pythagorean theorem?

Find the length of the hypotenuse in a right triangle with legs of length 3 and 4. Solution: $c = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5$ units.

Can you provide a problem involving the area of a rectangle?

Find the area of a rectangle with a length of 8 units and a width of 3 units. Solution: $\text{Area} = \text{length width} = 8 \cdot 3 = 24$ square units.

What is an example of a problem using the properties of parallel lines?

If two parallel lines are cut by a transversal, and one of the alternate interior angles is 65 degrees, what is the measure of the other alternate interior angle? Solution: The other angle is also 65 degrees.

How do you calculate the volume of a cylinder?

Find the volume of a cylinder with a radius of 3 units and a height of 10 units. Solution: $\text{Volume} = \pi r^2 h = \pi 3^2 10 = 90\pi \approx 282.74$ cubic units.

What is an example of a geometry problem involving similar triangles?

If two triangles are similar and one has a base of 6 units and a height of 4 units, and the other has a base of 9 units, what is its height? Solution: Using the ratio of bases, $\text{height} = (4/6) 9 = 6$ units.

Can you give an example of finding the perimeter of a polygon?

Find the perimeter of a pentagon with sides of lengths 5, 7, 3, 4, and 6 units. Solution: $\text{Perimeter} = 5$

$+ 7 + 3 + 4 + 6 = 25$ units.

How do you find the surface area of a rectangular prism?

Calculate the surface area of a rectangular prism with dimensions 2 units, 3 units, and 4 units.

Solution: Surface Area = $2(lw + lh + wh) = 2(23 + 24 + 34) = 2(6 + 8 + 12) = 52$ square units.

What is an example of a problem using angles in a triangle?

In a triangle, if one angle is 50 degrees and another is 60 degrees, what is the measure of the third angle? Solution: The sum of angles in a triangle is 180 degrees, so the third angle = $180 - 50 - 60 = 70$ degrees.

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