

Understanding the Pythagorean Theorem

The Pythagorean Theorem is a fundamental principle in mathematics, particularly in geometry. It applies to right-angled triangles and states that 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 can be expressed mathematically as:

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

where:

- **a** and **b** are the lengths of the two legs of the triangle, and
- **c** is the length of the hypotenuse.

For example, if a right-angled triangle has legs measuring 3 units and 4 units, the hypotenuse can be calculated as follows:

$$c^2 = 3^2 + 4^2$$

$$c^2 = 9 + 16$$

$$c^2 = 25$$

Taking the square root of 25 gives **c = 5**.

The Pythagorean Theorem is widely used in various fields, such as construction, navigation, and even computer graphics, to calculate distances or verify right angles. Its importance lies in its ability to connect geometry and algebra, making it a cornerstone of mathematical problem-solving.