



# Sine, Cosine and Tangent in Right-Angled Triangles

KS4 MATHEMATICS

TRIGONOMETRY

Ages 14-16



3 min read

## What are Sine, Cosine and Tangent?

**Sine**, **cosine** and **tangent** are three special ratios that help us work with **right-angled triangles** (triangles with one **90-degree angle**). They let us find missing side lengths or hidden angles when we only know a few measurements. These three ratios are so useful that mathematicians gave them short nicknames: **sin**, **cos** and **tan**.

## Understanding the Three Sides

In a right-angled triangle, there are three sides with special names. The longest side is called the **hypotenuse** — it's always opposite the right angle. The other two sides are called the **opposite** and **adjacent** sides, but their names depend on which angle you're looking at. The **opposite** side is across from the angle you care about, while the **adjacent** side is right next to it (but not the hypotenuse).

Think of it like standing in a stadium: the hypotenuse is the diagonal across the whole field, the opposite side is straight ahead of you, and the adjacent side is the sideline next to where you're standing.

## The Three Ratios Explained

**Sine** compares the opposite side to the hypotenuse. The formula is: **sin = opposite ÷ hypotenuse**. **Cosine** compares the adjacent side to the hypotenuse: **cos = adjacent ÷ hypotenuse**. **Tangent** compares the opposite side to the adjacent side: **tan = opposite ÷ adjacent**.

Students remember these with the acronym **SOHCAHTOA**: **S**ine is **O**pposite over **H**ypotenuse, **C**osine is **A**djacent over **H**ypotenuse, and **T**angent is **O**pposite over **A**djacent.

Think of it like recipes: each ratio is a different ingredient mix that tells you something unique about your triangle's shape.

## Why Does This Matter?

These ratios are incredibly powerful because they work the same way for every right-angled triangle. If you know one angle and one side length, you can use sine, cosine or tangent to find any other missing measurement. Architects use these ratios to design buildings, engineers use them to build bridges, and even video game designers use them to create 3D worlds. Once you understand how these three ratios work, you'll have a superpower for solving geometry problems!