



Sine, cosine and tangent: Real-world triangle superpowers

KS3 MATHS

Ages 11-14 ⌚ 3 min read

What Are Sine, Cosine and Tangent?

Sine, **cosine** and **tangent** are three special tools in maths that help us solve problems involving **triangles** and **angles**. They're ratios—fancy ways of comparing the lengths of different sides of a right-angled triangle. When you know one angle and one side length, these tools let you figure out all the other measurements.

Think about a **right-angled triangle**: it has one **90-degree angle** (the right angle) and two other angles. Each of these three tools focuses on the relationships between the sides in a specific way.

Think of it like a secret code. If you have one piece of information about a triangle, sine, cosine and tangent are your translator—they unlock all the other hidden measurements.

Why Do We Actually Use These?

These tools aren't just abstract maths—they solve real problems every single day. **Architects** use them to design buildings and work out how tall a structure needs to be. **Engineers** use them when building bridges, roads and tunnels. **GPS systems** in cars and phones rely on these calculations to figure out exactly where you are.

Surveyors use sine, cosine and tangent to measure land and create accurate maps. Pilots and sailors use them for **navigation**. Even video games use these functions to create 3D graphics and make characters move realistically!

Think of it like having a universal translator for triangles. Whenever a problem involves angles and distances, these three functions can help you find the answer.

How Do They Actually Work?

Sine compares the opposite side to the hypotenuse (the longest side). **Cosine** compares the adjacent side to the hypotenuse. **Tangent** compares the opposite side

to the adjacent side. Once you pick your angle, these ratios tell you exactly which sides to measure and how to use them.

A clever acronym helps students remember: **SOH-CAH-TOA**. This stands for Sine = Opposite over Hypotenuse, Cosine = Adjacent over Hypotenuse, and Tangent = Opposite over Adjacent.

The brilliant thing is that these ratios stay the same no matter how big or small your triangle is. A tiny triangle and a massive triangle with the same angles will have the same sine, cosine and tangent values—that's why they're so useful for solving real-world problems.