



# Working Out How Much Space Is Inside 3D Shapes

KS3 MATHS

Ages 11-14 ⌚ 3 min read

## What Is Volume?

**Volume** is the amount of **space inside a 3D shape**. It's different from **area**, which measures flat surfaces. When you want to know how much water a container can hold, or how much air is in a room, you're measuring volume.

Volume is measured in **cubic units**. A cubic unit is a tiny cube — if the measurements are in centimetres, we call it a **cubic centimetre (cm<sup>3</sup>)**. If they're in metres, it's a **cubic metre (m<sup>3</sup>)**.

Think of it like filling a swimming pool with water. The volume tells you exactly how many litres of water you need to fill it completely.

## How to Work Out Volume for Different Shapes

Different shapes need different **formulas** — special maths rules. Here are the most common ones you'll learn:

**For a cube or rectangular box:** multiply length  $\times$  width  $\times$  height. For example, a box that's **5 cm  $\times$  3 cm  $\times$  2 cm** has a volume of **30 cm<sup>3</sup>**.

**For a cylinder** (like a tin of beans): multiply the area of the circular base by the height. The formula is  $\pi \times \text{radius}^2 \times \text{height}$ . The symbol  $\pi$  (pi) is a special number that equals roughly **3.14**.

**For a sphere** (like a ball): use the formula  $\frac{4}{3} \times \pi \times \text{radius}^3$ . This one's trickier because spheres are round in every direction.

Think of it like following a recipe. Each shape is a different recipe — cubes need one method, cylinders need another, and spheres need a completely different one.

## Why Does This Matter?

Knowing how to work out volume is super useful in real life. Engineers use it when designing buildings, architects use it for water tanks, and scientists use it when

measuring chemicals. Even pizza boxes and cereal packets are designed by calculating volume!

The key thing to remember is that **all volumes are measured in cubic units**, and every shape has its own special formula to help you find the answer.