

Numeracy in Construction

Calculating Volume

Transcript



Narrator: A small construction team is building a home on a suburban block of land. This is the floor plan. A concrete slab is poured for the foundation. These are the various length and width measurements of the foundation. But a concrete slab also has height, also called depth, in this case 0.1 of one metre, which is the same as ten centimetres.

Twenty-four cubic metres of concrete have been ordered. Cubic metres, or metres cubed, is a measurement of volume. Volume is the amount of space taken up by a 3D object. Volume of regular geometric objects is calculated by multiplying their length by their width by their depth. Like this box. Its length is sixteen centimetres, its width is ten centimetres and its depth is six centimetres. Taking the equation for calculating volume, we work out the box's volume like this. Sixteen centimetres times ten centimetres times six centimetres equals 960 centimetres cubed, or cubic centimetres. Volume has three dimensions so the unit of measurement is always cubed. That's what the small three means above the unit of measurement. In this example it's centimetres cubed but in the case of the concrete slab it will be metres cubed

We can calculate the volume of concrete required for this slab because we have the different dimensions we need: the length, the width and the depth. But because the slab is not a regular shape like a rectangle or a square, we first need to break it into five rectangles. A three-dimensional shape, like this slab, is called a prism. Once we have calculated the volume of each of the five rectangular prisms, we'll add them together to work out the total volume of concrete needed for this job.

Let's calculate the volume of the two larger rectangular prisms. For the first one, the length is fourteen metres, the width is 6.5 metres and the depth of the slab is 0.1 metre. In our calculations, it is important to make sure that all dimensions are measured in the same unit. That's why we say the depth is 0.1 metre and not ten centimetres or one hundred millimetres. So we multiply the length by the width by the depth. That's fourteen times 6.5 times 0.1, which equals 9.1 metres cubed. The second-largest section of the slab is also a rectangular prism. Its length is 13.5 metres, its width is 6.5 metres and the depth of the slab is 0.1 metre. Volume equals length times width times depth. 13.5 times 6.5 times 0.1, which equals 8.775 metres cubed.

There are also three smaller rectangular prisms. Using the same formula for volume, this first smaller one has a volume of 2.4 metres cubed. This second smaller rectangular prism has a volume of three metres cubed and the third smaller prism has a volume of 0.25 metres cubed. Add the volume of the five sections of the concrete slab together and the total volume is 23.525 metres cubed. The concrete can only be delivered in whole cubic metres so the order is correct.

To sum up, volume is a three-dimensional measurement of how much space something occupies. For a regular-shaped object, it is calculated by multiplying the length by its width by its depth. Sometimes it just takes a little mathematical thinking to break down an irregular shape into regular ones that is easier to calculate.