Monday, 20 July 2026

Connect

Title

SI Units – Geometry equations
Calculating volume of 3D shapes

Today's Targets

Identify equations for geometry - Volume

Select which equations from a given list would be used for a specified engineering product or project

Connect:

V = 9 Volts	R = 2 Ohm	**I = 4.5A**

Breathing ventilator

Biomedical

Avoid lifting

Monday, 20 July 2026

Today's title: SI Units – Geometry equations - volume

Today's Targets

Identify equations for calculating volume

Select which equations from a given list

Today's Learning:

You must be able to:

Define what volume is.

Calculate the volume of cubes.

Calculate the area of cylinders.

Calculate the area of pyramids.

You may also be able to:

Calculate the volume of compound shapes.

Prior Learning

CA1 Engineering disciplines

Future Learning

CA3

Reading engineering drawings

Literacy

International System (SI) Equation
Geometry Volume

NCFE Level 1 / 2 Technical Award in Engineering

CA2 - Applied science and mathematics in engineering

2.2.1 SI Units of Measurement - equations
Geometry - Volume
Lesson 8

Monday, 20 July 2026

Today's title: 2.2: Engineering equations - area

Your target	Steps to success	Path to progress
• Identify equations for geometry • Select which equations from a given list which would be used for a specified engineering product or project	• Apply data to a selected equation to complete a calculation for a specified engineering product or project	• Justify the selection of the equation • Assess whether the correct calculation has been used

Key terms

International System (SI)
Equation
Geometry
Volume

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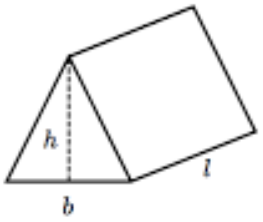
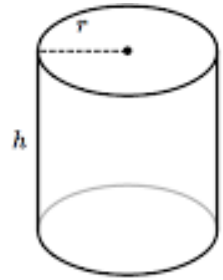
Activate

What is volume?

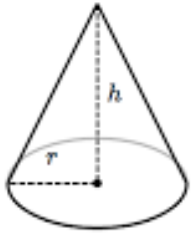
Volume is the measure of the amount of 3-dimensional space an object takes up. It is also known as capacity.



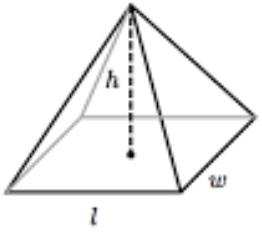
$$V = \frac{b \cdot h \cdot l}{2}$$



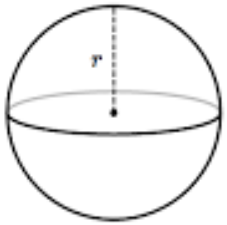
$$V = \pi r^2 h$$



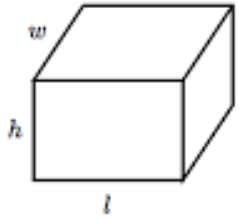
$$V = \frac{\pi r^2 h}{3}$$



$$V = \frac{l \cdot w \cdot h}{3}$$



$$V = \frac{4}{3}\pi r^3$$



$$V = l \cdot w \cdot h$$

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3D Geometry

Volume of a cube length of side^3

Volume of a pyramid (1/3) x (base area) x height of pyramid

Volume of a cylinder = π x radius^2 x height of cylinder

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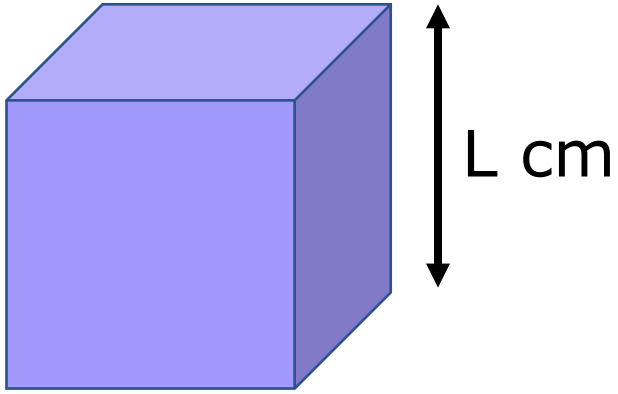
Volume of a cube

A cube is a three dimensional solid with six square faces of the same length.

To find the volume of a cube, we need to know the **length of any one edge of the cube**. The length is to be multiplied by itself three times to get the volume. The volume is measured in cubic units.



$$V = L \times L \times L = L^3 \text{ cm}^3$$

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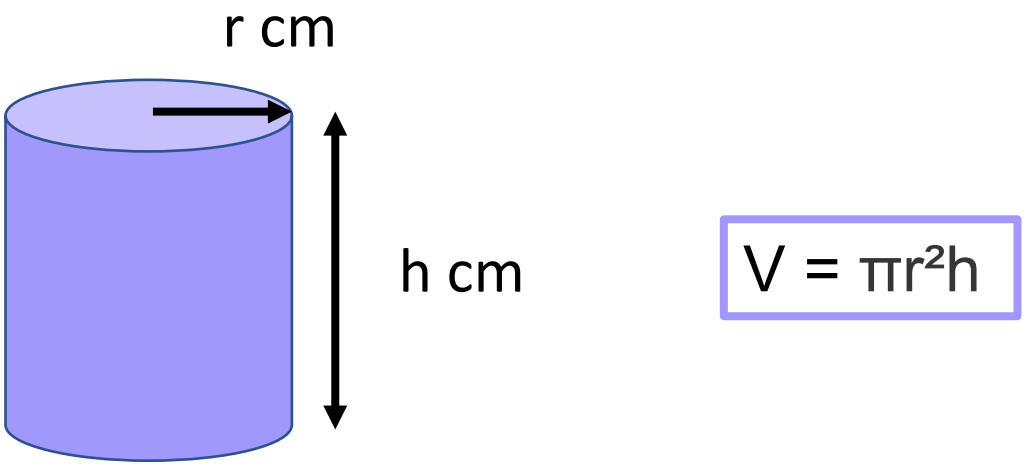
Volume of a cylinder

A cylinder is made up of a rolled surface with a circular top and a circular base.

To find the volume of a cube, we need to know the **length of its radius and its height**.



$V = \pi r^2 h$

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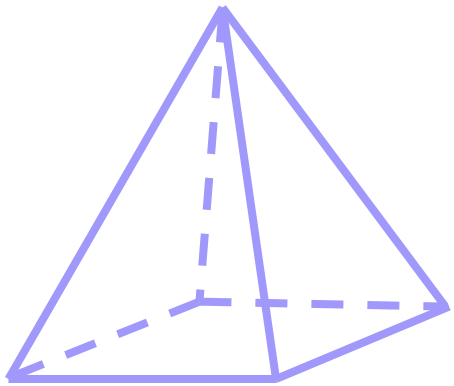
Volume of a pyramid

A pyramid is a three-dimensional figure. **It has a flat polygon base**. All the other faces are triangles and are called lateral faces. The number of lateral faces equals the number of sides on its base.

The base area of a pyramid depends on its shape.



Volume = 1/3 × base area × height

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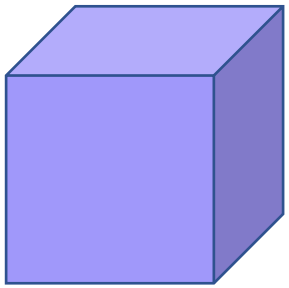
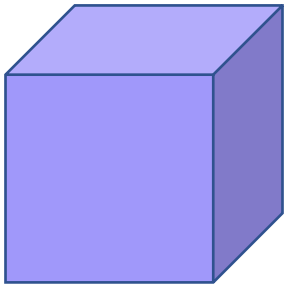
Volume calculations 1. Complete the cube volume calculations below and display the answers on your mini-whiteboards.

1. V =



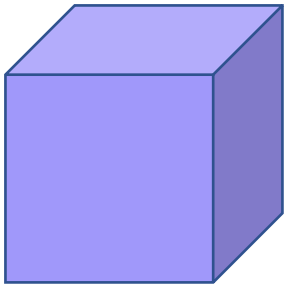
13cm

2. V =



25cm

3. V =



41cm

- volume – cube — length of side³
- volume – pyramid — (1/3) x (base area) x height of pyramid
- volume – cylinder — π x radius² x height of cylinder

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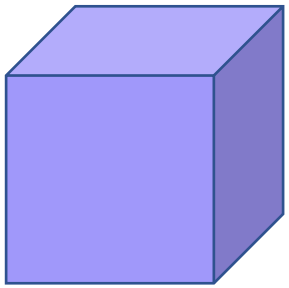
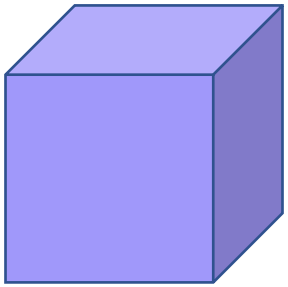
Volume calculations 1. - *answers*

1. V = **2197cm³**



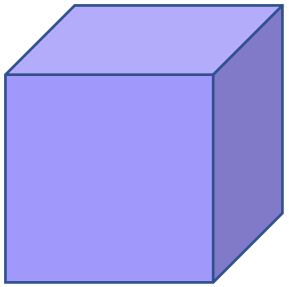
13cm

2. V = **15,625cm³**



25cm

3. V = **68,921cm³**



41cm

- volume – cube — length of side³
- volume – pyramid — (1/3) x (base area) x height of pyramid
- volume – cylinder — π x radius² x height of cylinder

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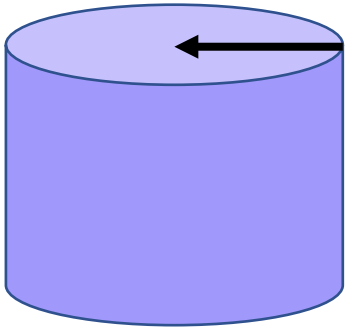
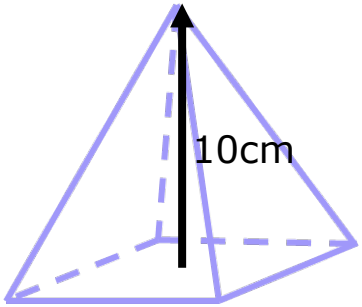
Activate

Volume calculations 2. Complete the shape volume calculations below and display the answers on your mini-whiteboards.

1. V =



2. V =



- volume – cube — length of side³
- volume – pyramid — (1/3) x (base area) x height of pyramid
- volume – cylinder — π x radius² x height of cylinder

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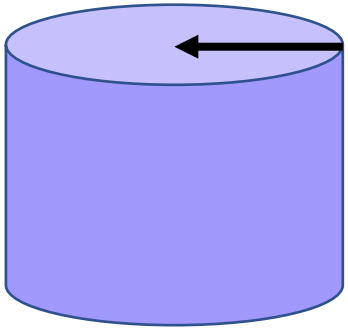
Activate

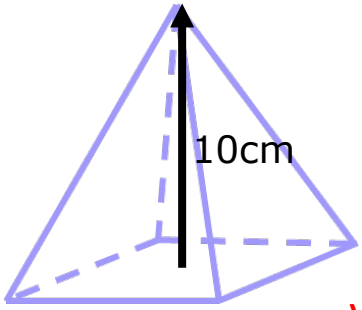
Volume calculations 2. Complete the shape volume calculations below and display the answers on your mini-whiteboards.

1. V = **1570cm³**



V=πr2h=π x 5 x 5 x 20 = 1570.79633

2. V = **83.3cm³**



$V=\frac{lwh}{3} = V=\frac{5 \times 5 \times 10}{3}$

= 83.33333

- volume – cube — length of side³
- volume – pyramid — (1/3) x (base area) x height of pyramid
- volume – cylinder — π x radius² x height of cylinder

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Demonstrate

1. Find the **volume** of the cuboids:

a. l = 10, b = 20, h = 5. V = _____

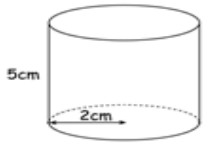
b. l = 18, b = 6, h = 20. V = _____

c. l = 42, b = 52, h = 22. V = _____

2. Calculate the **volume** of figure 7.

Show your working. [3 marks]

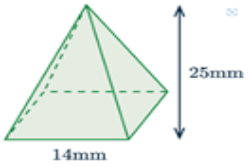
Figure 7



3. Calculate the **volume** of figure 8.

Show your working. [3 marks]

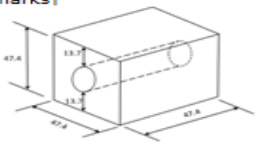
Figure 8



4. Figure 9 shows an aluminium component.
Calculate the total **volume** of the aluminium component with the cylindrical hole cut through it.
Mass of the product = 247.37g
Value of n = 3.14

Show your working. [5 marks]

Figure 9



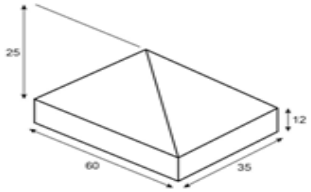
5. An engineer is fabricating a new kitchen extraction hood as shown in Figure 10. It is a combination of a cuboid shape with a pyramid top.

Calculate the total **volume** of the shape.

All dimensions are in cm.

Show your working. [4 marks]

Figure 9



Name two SI units of measurement commonly used in civil engineering. _____

25 minutes!

[Volume of 3D Shapes Worksheets | Questions and Revision | MME (mmerevise.co.uk)]

- volume – cube — length of side³
- volume – pyramid — (1/3) x (base area) x height of pyramid
- volume – cylinder — π x radius² x height of cylinder

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Consolidate

Can you now?

- Define what volume is?
- Calculate the volume of cubes?
- Calculate the area of cylinders?
- Calculate the area of pyramids?
- Calculate the volume of compound shapes?

Next lesson…

We will learn about…

…how to look at reading and interpreting engineering drawings accurately; the contents of a title block, the two systems of measurement and the use of scale in an engineering drawing