LESSON PLAN

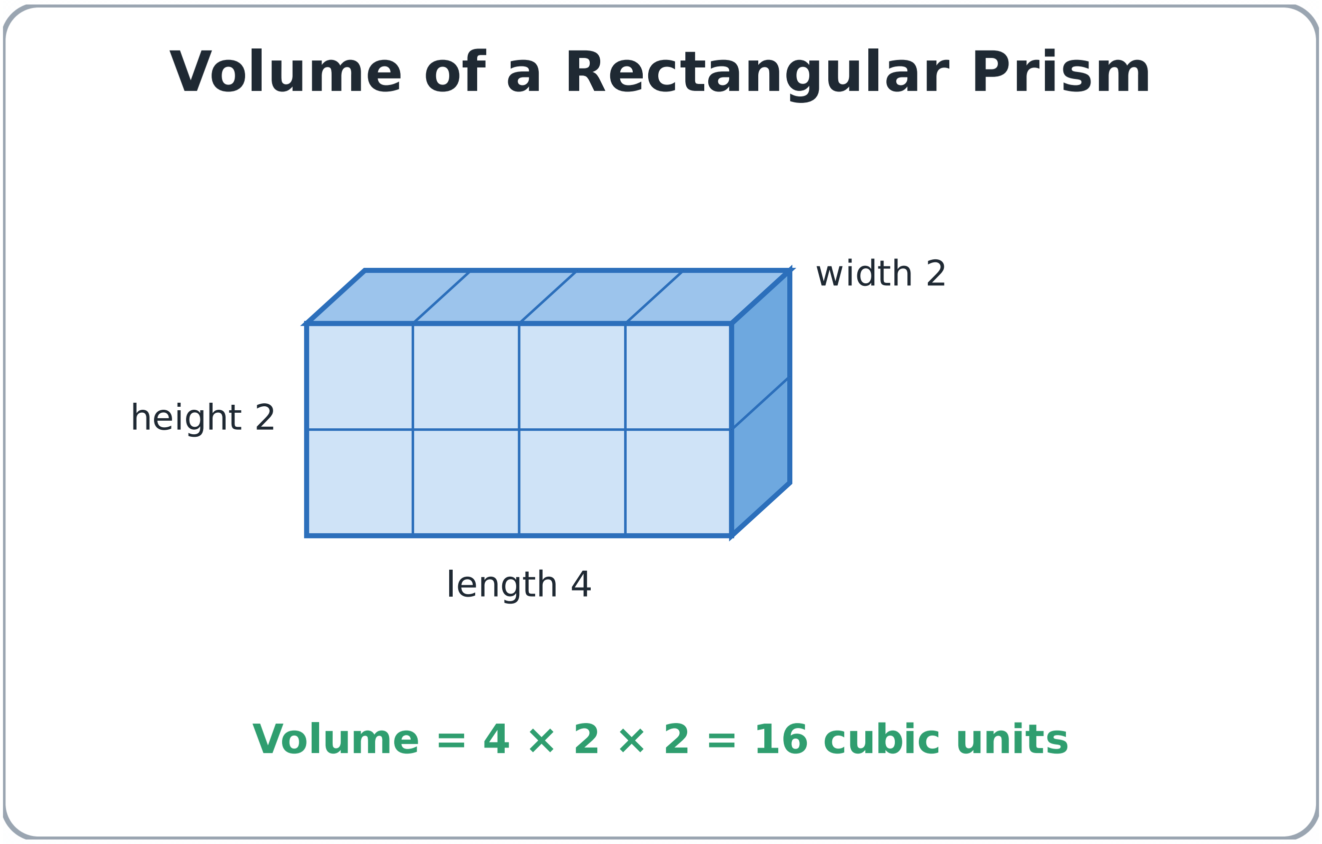
3D Space & Structures: Prisms, Pyramids & Volume

Explicit teaching — I Do (~15 min)

1. Visualising & constructing 3D objects WA6MMGTH1

Show real prisms and pyramids; name them by their cross-section or base (triangular prism, square pyramid). Demonstrate sketching a rectangular prism using oblique projection, then fold a net to construct one.

2. Volume of rectangular prisms WA6MMGTH2



Count one layer, then multiply by the number of layers.

> **Worked example.** Build a $4 \times 3 \times 2$ prism from centimetre cubes. One layer $= 4 \times 3 = 12$ cubes; 2 layers $= 24$ cubes. Generalise: find the area of the base, then multiply by the height — $length \times width \times height$.

Record the sequence of steps explicitly so students can apply it to any prism.

Guided practice — We Do (~20 min)

1. **Sort & name.** Sort a set of 3D models into prisms versus pyramids; name each by its base.
2. **Build & count.** The class builds several rectangular prisms from cubes and counts volume by layers.
3. **Derive the steps.** Co-construct the step sequence "area of base $\times$ height" and test it against the cube counts.
4. **Apply.** Find the volume of three prisms from given dimensions, without building.

Independent practice — You Do (~15 min)

Worksheet/task:

- name given prisms and pyramids by their base;
- sketch a rectangular prism on oblique grid paper;
- determine the volume of rectangular prisms from given dimensions, showing the step sequence;
- one "missing dimension" challenge (given volume and two dimensions, find the third).

> **Exit ticket.** Find the volume of a prism $5\ cm \times 3\ cm \times 2\ cm$ and state the units.

Teacher notes

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Curriculum links: WA6MMGTH1, WA6MMGTH2. Builds on area (Lesson 7).

Materials: centimetre cubes, nets to fold, real prism and pyramid models, isometric/oblique grid paper.

Common misconceptions

- Confusing prisms (uniform cross-section) with pyramids (apex).
- Counting only visible cubes and missing hidden interior cubes.
- Confusing volume (cubic units) with area (square units) — reinforce cm^3 vs cm^2.

Assessment for learning: ask students to predict the cube count before building, then check — this reveals layer reasoning.

Approaches

KINESTHETIC · HANDS-ON CONSTRUCTION APPROACH

Hands-on construction approach

Make 3D learning tactile and constructive so volume is felt, not just calculated.

Build and separate layers. Every student builds rectangular prisms from centimetre cubes and physically separates them into layers to feel why volume = base layer × number of layers.

Cut and fold nets. Provide nets to fold into prisms and pyramids; handling the faces builds the prism-vs-pyramid distinction.

Fill and pour. Fill a hollow prism with cubes or rice to connect counting cubes to capacity.

Hidden cubes challenge. Show a drawing of a stacked prism and ask students to build it to reveal the cubes they could not see.

DIGITAL · DIGITAL 3D MODELLING: BUILD IT ON SCREEN

Digital 3D Modelling: Build It On Screen

This approach uses free 3D-building software (or interactive isometric cube tools / tablet apps) so students can construct, rotate and slice solids — perfect for learners who benefit from manipulating objects digitally.

Stack and count. In an online unit-cube builder, students recreate prisms A, B and C from the diagram, rotate them to confirm the hidden cubes, and check their volume by counting versus $l \times w \times h$.

Fold a net. Using an interactive net tool, students drag the faces of a cube net and watch it fold into a solid, then try the eleven cube nets to discover which arrangements work and which do not.

Design challenge. Students model a solid with a target volume (e.g. exactly 36 cubic units) in as many different shapes as they can, recording each set of dimensions.

Rotate to count. Spinning a solid on screen lets students count faces, edges and vertices reliably, then test the relationship $F + V - E = 2$.

Why it works. On paper, hidden cubes and back faces are easy to miss. Rotating a model on screen removes that barrier, so students reason about volume and structure rather than struggling to interpret a 2D drawing.

Pair digital modelling with at least one real, physical solid so students connect the on-screen object to the hands-on experience of holding it.