Geometry in 3d

Reasoning with Properties of 3D Shapes	Recognise, name and describe common 3D shapes. Use specialist terminology such as Face, Edges, Vertices, Prism, Cross Section, Plane etc.	
Nets	Draw nets for common 3D shapes and identify 3D shapes from given nets. Include surface area.	Product design
Plans and Elevations	Draw plans and elevations of common 3D shapes and identify 3D shapes from corresponding plans and elevations. Include surface area.	Fire escape plans in buildings
Volume of Cubes and Cuboids	Understand that volume is the amount of cubed units. Understand why the cross section is important and why it is multiplied. Include forming and solving.	Health and safety number pf people per cubic m. Fuel calculations
Volume of Prisms	Calculate the volume of prisms with cross sections of Triangles, Parallelogram, Trapeziums. Include forming and solving.	
Volume of Cylinders	Calculate the volume of cylinders. Include forming and solving.	Paint cans. Petrol tankers
Designing a bedroom Project 2 - 3 lessons		

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Volume of Composite Shapes	Calculate the volume of compound shapes made from a mixture of shapes taught previously. Including shapes with missing sections. Include forming and solving.	
Easter Egg Project 2 - 3 lessons	Drawing/designing nets Volume Money Percentages	

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Volume of Cones, Pyramids and Spheres	Calculate the volume of Cones, Pyramids, Spheres, Hemispheres and Frustrums when given the formulae.	How many footballs would fit in this room?
Easter Egg Project 2 - 3 lessons	Drawing/designing nets Volume Money Percentages	

Key Knowledge/Prior Learning KS2/3 and Retrieval and Suggested Starters

- Drawing 2 dimensional shapes
- Finding the area of a shape
- Area of 2d shapes
- Circles – parts
- Circles - circumference

KS3 National Curriculum – what students will be practicing and Key Questions

- Identify common 3D shapes and use mathematical terminology to describe their features.
- Draw nets, plan and elevations of 3D shapes and be able to identify a shape from its net, plan and elevation.
- Find the volume of a 3D shape inc cylinders
- Find the volume of a 3D compound shape
- Incorporate algebra into volume problems

- Volume of pyramids, cones and spheres

Specific Ambitious Knowledge

- Plans and elevations – explaining different tiers and hidden aspects through solid and dashed lines
- Use of algebra
- Reverse Volume (finding lengths)

Key Vocabulary/Literacy Opportunities

- Faces
- Edges
- Vertices
- Prism
- Cross-section
- Volume
- Surface Area
- Net
- Plan
- Elevation
- Perspective
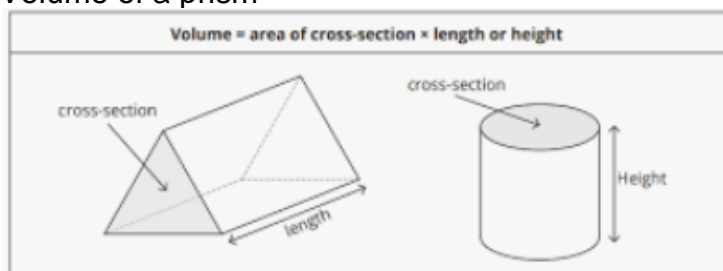- Capacity

Key Formulae/Knowledge

Cuboid:

Volume of Cube Formula

Every edge of the cube is the same length.
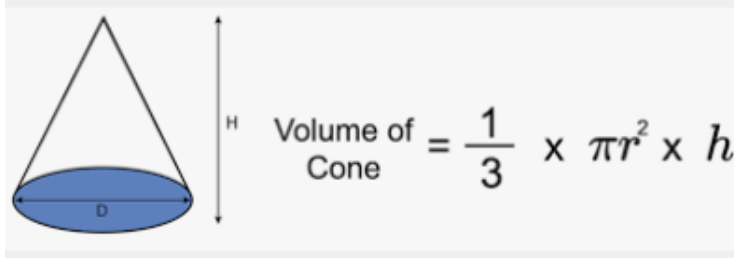
$V = w \cdot l \cdot h$

Volume of a prism

Volume = area of cross-section × length or height

cross-section

cross-section

Height

length

Volume of a pyramid

Volume of Pyramid

$$V = \frac{1}{3}Bh$$

where $B =$ area of base

Volume of a cone

$$\text{Volume of Cone} = \frac{1}{3} \times \pi r^2 \times h$$

Volume of a sphere

Volume of a Sphere

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

Features of 3d shapes

edge

face

vertex or corner

Plans and elevations

Plan view

Front elevation   Side elevation
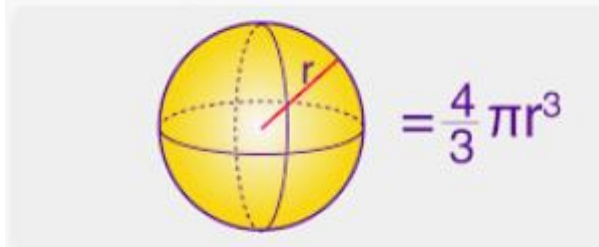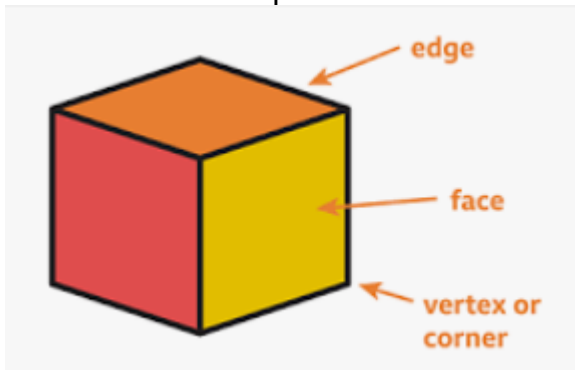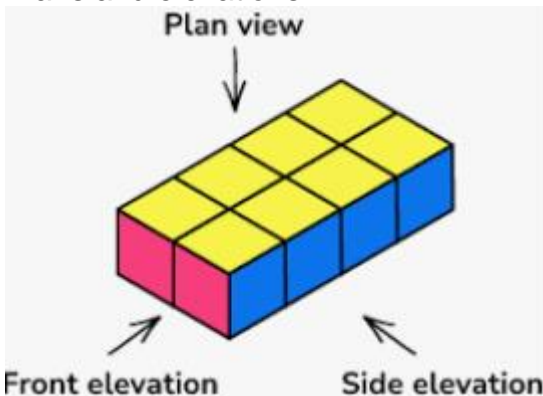
Maths in Context (Historical, Real Life and Student Thinking Points)

Projects/Enrichment/Investigations
Easter Egg project Students are asked to design a chocolate product and its packaging. They are then given constraints on product pricing and percentage gain to calculate profit.   Includes: - Finding the volume of a 3D shape   - Drawing and designing nets   - Converting units between length, area and volume.   - Finding a percentage increase/decrease   - Calculating a profit margin