Title: **Volume, Compound Measure and Real Life Graphs**

Key Knowledge/Prior Learning KS2/3 and Retrieval and Suggested Starters
• Know and apply formulae to calculate the volume of cuboids and other right prisms (including cylinders) • Use standard units of measure and related concepts (length, area, volume / capacity, mass, time, money etc)

KS3 National Curriculum – what students will be practicing
• Calculate the volume of spheres, pyramids, cones and composite solids • Change freely between related standard units (e.g. time, length, area, volume / capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts • Use compound units such as speed, rates of pay, unit pricing, density and pressure • Plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration • Interpret the gradient of a straight-line graph as a rate of change

Specific Ambitious Knowledge

Key Vocabulary/Literacy Opportunities
• Dimensions • Cross-section • Prism • Base • Perpendicular Height •

Key Formulae/Knowledge
$Volume\ of\ cuboid = Length \times Width \times Height$ $Volume\ of\ prism = Cross\ section\ area \times Length$

Volume of pyramids

Pyramids are another type of 3D shape. Pyramids can have different 2D shapes as their base – triangles, squares or rectangles. The formula for calculating the volume of a pyramid is:

$$Volume = \frac{1}{3} \times Perpendicular\ height \times Area\ of\ base$$

Volume of spheres

The formula for the volume of a sphere is:

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

Volume of cones

The formula for the volume of a cone is:

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

Maths in Context (Historical, Real Life and Student Thinking Points).

- Link to accessible proof of the volume of a pyramid and cone (no calculus) https://nrich.maths.org/1408
- This leads to this idea to prove the volume of a sphere https://nrich.maths.org/1412

Projects/Enrichment/Investigations

- **Immersion**
- https://nrich.maths.org/2650?utm_source=secondary-map
- **Gutter**
- **Fill Me up Too**
- **Speeding Boats**
- **Speed-time Problems at the Olympics**