Surface area to volume ratio

Teacher / technician

YEAR 10 / LESSON 17 / BIOLOGY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Original learning tasks; no supplied numerical example represents class measurements.

Coverage and delivery

Shared Biology / Double Award: 2.15–2.16. Exchange and organism size.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Student booklets	1 per learner	30
Paper model sets / rulers	1 per pair	15 of each

Immediate safety

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Preparation and delivery

Read alongside the student method

YEAR 10 / LESSON 17 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. Provide 30 booklets and 15 sets of paper or reusable modelling materials.

2. Keep answers separate until learners have attempted the tasks; discuss the reasons for corrections.

Close of lesson

• Return models and keep the corrected work.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

YEAR 10 / LESSON 17 / BIOLOGY + SCIENCE (DOUBLE AWARD)

- 24 cm^2, 8 cm^3 and 3 cm^{-1}.
- The 3 cm cube: 54 cm^2.
- The 1 cm cube: 6 cm^{-1}.
- $[1-0.6^3/1^3]\times100 = 78.4\%$.
- Longer diffusion distances make reaching internal regions slower under comparable conditions.
- Folding or branching increases area, and a thin barrier shortens diffusion distance; ventilation or circulation can maintain gradients.

References and provenance

Pearson Biology specification

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.