

Area & Volume

Every area and volume question is really a formula matching question. Spot the shape, pull the right formula, and plug it carefully. The reference sheet is given on test day. Knowing which formula to reach for is what actually saves your time.

1 What this topic actually tests

Area measures the space inside a 2D shape. **Volume** measures the space inside a 3D solid. The SAT rarely asks you to just plug numbers into a formula. It usually wraps the formula inside a word problem, a composite figure, or a question about how changing one dimension affects the total.

Most of these questions come down to three skills: **identifying the shape or shapes involved**, **choosing the correct formula**, and **tracking units**, especially when a dimension is given in different units or the question asks for area or volume rather than a length.

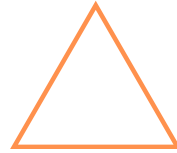
1

2d shapes - area formulas



Rectangle

$$A = l \cdot w$$



Triangle

$$A = \frac{1}{2} b \cdot h$$



Circle

$$A = \pi r^2$$

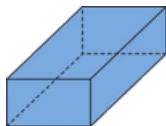


Trapezoid

$$A = \frac{1}{2} (b_1 + b_2) h$$

2

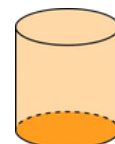
3d solids --- Volume & surface area



Rectangular prism

$$V = l \cdot b \cdot h$$

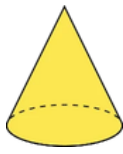
$$SA = 2 (lw + lh + hw)$$



Cylinder

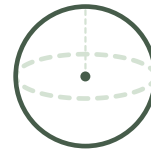
$$V = \pi r^2 h$$

$$SA = 2\pi r^2 + \pi r h$$



Cone

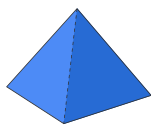
$$V = \frac{1}{3} \pi r^2 h$$



Sphere

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

$$SA = 4\pi r^2$$



Pyramid

$$V = \frac{1}{3} b \cdot h$$

2

Mistakes that quietly cost points



Using diameter when the formula needs radius. If a problem gives the diameter, divide by two before substituting into any area or volume formula that uses r .



Forgetting units, square or cube. Area answers need square units and volume answers need cubic units. A bare number without the right unit label can cost a point on grid-in questions.



Mixing up volume and surface area formulas. Volume measures space inside a solid. Surface area measures the covering around the outside. They are never interchangeable even for the same shape