

Exercise walk-through

4.2.6

Solid Measure

AQA · GCSE · Mathematics

92. Solid properties, plans and elevations · Foundation

Solid properties, plans and elevations · Foundation

A cube or cuboid has 6 faces, 12 edges and 8 vertices. A triangular prism has 5 faces, 9 edges and 6 vertices; a square pyramid has 5 faces, 8 edges and 5 vertices. A cylinder has two circular flat faces and one curved surface, with no vertices. A cone has one flat circular face, one curved surface and one apex; a sphere has only a curved surface. For a cuboid of width 4, depth 3 and height 2 units, the plan is 4 by 3, front elevation 4 by 2 and side elevation 3 by 2. A stack with front-row column heights 1 and 3, and back-row heights 2 and 1, occupies four cells.

99. Measuring angles and three-figure bearings · Foundation

Measuring angles and three-figure bearings · Foundation

From A to B the bearing 070° is 70° clockwise from north. From B to A it is $070+180=250^\circ$. A bearing of 320° reverses to $500-360=140^\circ$. East is 090° , not 90 without its three-digit form. A route bearing 120° points southeast of the starting point, making 30° below east. On a 1:10000 map, a 3 cm route represents 300 m; to construct bearing 120° , place the protractor centre at the route start, align its zero with north and measure clockwise. Keep the ruler scale and angular direction as separate decisions.

131. Prism volume and cylinder measurement · Foundation

Prism volume and cylinder measurement · Foundation

A triangular prism with end base 6 cm, end height 4 cm and length 10 cm has cross-section 12 cm^2 and volume 120 cm^3 . A cylinder of radius 3 cm and height 5 cm has volume $45\pi \text{ cm}^3$. Its curved surface unwraps to a rectangle of width $2\pi r = 6\pi$ and height 5, so curved area is $30\pi \text{ cm}^2$. Adding two ends gives total area $30\pi + 18\pi = 48\pi \text{ cm}^2$. An open-top tank of those dimensions has surface area $39\pi \text{ cm}^2$ because it keeps only one end. If a prism has volume 180 cm^3 and cross-section 15 cm^2 , its length is 12 cm.

Exercises 2.1·2.3

2.1 (Foundation) Find the coefficient of π in cone volume for $r=3, h=4$.

2.2 (Foundation) Find square-pyramid volume for base side 6, height 4.

2.3 (Foundation) Find the coefficient of π in frustum volume for large cone $r=6, h=8$ minus small $r=3, h=4$.

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Foundation) Find the coefficient of pi in cone volume for $r=3, h=4$.

$$\mathbf{2.1} \quad (1/3) \times 3^2 \times 4 = 12.$$

2.2 (Foundation) Find square-pyramid volume for base side 6, height 4.

$$\mathbf{2.2} \quad (1/3) \times 36 \times 4 = 48.$$

2.3 (Foundation) Find the coefficient of pi in frustum volume for large cone $r=6, h=8$ minus small $r=3, h=4$.

3 Exam-style questions

$$\mathbf{2.3} \quad 96 - 12 = 84.$$

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: A cone's slant height can always replace its perpendicular height in the volume formula.

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3.1 False. Radius 3, perpendicular height 4 and slant height 5 give volume $(1/3)\pi \times 9 \times 4 = 12\pi$. Using 5 instead incorrectly gives 15π .

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.