Area, Volume and Similar Shapes

Geometry and measures · 6 questions · step-by-step answers at the end

Name: Date: Score: / 6

USEFUL EQUATIONS

$A = \pi r^2$, $C = 2\pi r$ $V = \pi r^2 h$, $V = (1/3)\pi r^2 h$, $V = (4/3)\pi r^3$

sector area $= (\theta/360)\pi r^2$, arc $= (\theta/360)2\pi r$ length k, area k^2, volume k^3

Questions

Show your working in the space under each question.

1. EASY A trapezium has parallel sides 6 cm and 10 cm and height 4 cm. Find its area.

2. EASY A sector has radius 6 cm and angle 60°. Find its area and arc length.

3. MEDIUM Find the volume and surface area of a sphere of radius 3 cm.

4. MEDIUM A cone has radius 6 cm and height 8 cm. Find its volume and curved surface area.

5. HARD A prism has a triangular cross-section of base 6 cm and height 4 cm, and length 10 cm. Find its volume.

6. HARD Two similar bottles have surface areas in the ratio 16 : 25. The smaller holds 320 ml. How much does the larger hold?

Step-by-step answers

Area, Volume and Similar Shapes

1. $(1/2)(6 + 10)(4) = \mathbf{32\ cm^2}$.
2. Fraction 60/360 = 1/6. Area = $(1/6)\pi(36) = 6\pi = \mathbf{18.8\ cm^2}$. Arc = $(1/6)(12\pi) = 2\pi = \mathbf{6.28\ cm}$.
3. $V = (4/3)\pi(27) = 36\pi = \mathbf{113\ cm^3}$. $A = 4\pi(9) = 36\pi = \mathbf{113\ cm^2}$.
4. $V = (1/3)\pi(36)(8) = 96\pi = \mathbf{302\ cm^3}$. Slant height = $\sqrt{(36 + 64)} = 10$, so curved area = $\pi rl = 60\pi = \mathbf{188\ cm^2}$.
5. Cross-section = $(1/2)(6)(4) = 12\ cm^2$. Volume = $12 \times 10 = \mathbf{120\ cm^3}$.
6. Length ratio = $\sqrt{16} : \sqrt{25} = 4 : 5$. Volume ratio = 64 : 125. $320 \times 125/64 = \mathbf{625\ ml}$.