

Area, Surface Area, and Volume: math test solutions, Grade 10 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 A shed wall

/ 3 pts

- a. Rectangle: $10 \cdot 6 = 60$ (0.5 pt). Triangle: $\frac{1}{2} \cdot 10 \cdot 4 = 20$ (1 pt). Total 80 m^2 (0.5 pt).
- b. $80 \cdot 3.50 = 280$, so the cost is 280 dollars (1 pt).

2 A fish tank

/ 3 pts

- a. $V = 60 \cdot 30 \cdot 40 = 72,000 \text{ cm}^3 = 72 \text{ L}$ (1 pt).
- b. $\frac{3}{4} \cdot 72 = 54 \text{ L}$ (1 pt).
- c. Total $2(1800 + 2400 + 1200) = 10,800$, minus the top 1,800, gives $9,000 \text{ cm}^2$ (1 pt).

3 Cylinder and cone

/ 4 pts

- a. $V = \pi \cdot 16 \cdot 9 = 144\pi \approx 452.39 \text{ cm}^3$ (1 pt).
- b. $V = \frac{1}{3} \cdot 144\pi = 48\pi \approx 150.80 \text{ cm}^3$ (1 pt).
- c. $SA = 2\pi \cdot 16 + 2\pi \cdot 4 \cdot 9 = 32\pi + 72\pi = 104\pi \approx 326.73 \text{ cm}^2$ (1 pt).
- d. $\frac{144\pi}{48\pi} = 3$ times (1 pt).

4 A ball

/ 3 pts

- a. The radius is 12 cm (0.5 pt). $SA = 4\pi \cdot 144 = 576\pi$ (0.75 pt).
 $V = \frac{4}{3}\pi \cdot 1728 = 2304\pi$ (0.75 pt).
- b. $2304\pi \approx 7238.23 \text{ cm}^3 \approx 7.24 \text{ L}$ (1 pt).

5 Slicing a pyramid

/ 4 pts

- a. $V = \frac{1}{3} \cdot 256 \cdot 12 = 1024 \text{ cm}^3$ (1 pt).
- b. The plane is 9 cm below the apex, so $k = \frac{9}{12} = 0.75$ (1 pt). The side is $16 \cdot 0.75 = 12$ cm and the area is 144 cm^2 (1 pt).
- c. $V = \frac{1}{3} \cdot 144 \cdot 9 = 432 \text{ cm}^3$ (1 pt), which equals $1024 \cdot 0.75^3$.

6 Steel ball and Cavalieri

/ 3 pts

- a. $V = \frac{4}{3}\pi \cdot 27 = 36\pi \approx 113.10 \text{ cm}^3$ (1 pt).
- b. $m \approx 113.10 \cdot 7.85 \approx 887.8 \text{ g}$ (1 pt).
- c. Both stacks lie between the same two planes, and every plane parallel to them cuts each stack in a rectangle of the same area, so Cavalieri's principle says the volumes are equal (1 pt).



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