



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Volume & Surface Area · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Volume & Surface Area

Total marks available: 123

● Volume & Surface Area

✓380m²

Q1 · ● Developing · 4 marks

METHOD

$$\text{Surface area} = 2(lw + lh + wh)$$

$$\text{Surface area} = 2 \times (56.58 + 97.17 + 36.34) = 380\text{m}^2$$

✓4810cm³

Q2 · ● Developing · 4 marks

METHOD

$$\text{Volume} = \pi r^2 h = \pi \times 10.0^2 \times 15.3 = 4810\text{cm}^3$$

✓244cm²

Q3 · ● Developing · 4 marks

METHOD

$$\text{Surface area} = 2(lw + lh + wh)$$

$$\text{Surface area} = 2 \times (26.22 + 53.01 + 42.78) = 244\text{cm}^2$$

✓1400m³

Q4 · ● Developing · 4 marks

METHOD

$$\text{Volume} = \pi r^2 h = \pi \times 6.1^2 \times 12.0 = 1400\text{m}^3$$

✓298m²

Q5 · ● Developing · 4 marks

METHOD

$$\text{Surface area} = 2(lw + lh + wh)$$

$$\text{Surface area} = 2 \times (45.36 + 63.0 + 40.5) = 298\text{m}^2$$

✓549cm²

Q6 · ● Developing · 4 marks

METHOD

Surface area = $2(lw + lh + wh)$

Surface area = $2 \times (170.18 + 53.6 + 50.8) = 549\text{cm}^2$

✓1020m³

Q7 · ● Developing · 4 marks

METHOD

Cross-sectional area = $\frac{1}{2} \times 15.4 \times 12.8 = 98.56\text{m}^2$

Volume = $98.56 \times 10.3 = 1020\text{m}^3$

✓780m³

Q8 · ● Developing · 4 marks

METHOD

Cross-sectional area = $\frac{1}{2} \times 8.7 \times 12.8 = 55.68\text{m}^2$

Volume = $55.68 \times 14.0 = 780\text{m}^3$

✓622cm²

Q9 · ● Developing · 4 marks

METHOD

Surface area = $2(lw + lh + wh)$

Surface area = $2 \times (76.7 + 151.04 + 83.2) = 622\text{cm}^2$

✓675m³

Q10 · ● Developing · 4 marks

METHOD

Volume = length $\times$ width $\times$ height

Volume = $12.0 \times 4.5 \times 12.5 = 675\text{m}^3$

✓1190cm³

Q11 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{1}{3}\right)\pi r^2 h$$

$$\text{Volume} = \left(\frac{1}{3}\right) \times \pi \times 7.8^2 \times 18.6 = 1190\text{cm}^3$$

✓5580cm³

Q12 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{4}{3}\right)\pi r^3$$

$$\text{Volume} = \left(\frac{4}{3}\right) \times \pi \times 11.0^3 = 5580\text{cm}^3$$

✓1500m³

Q13 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{1}{3}\right)\pi r^2 h$$

$$\text{Volume} = \left(\frac{1}{3}\right) \times \pi \times 10.3^2 \times 13.5 = 1500\text{m}^3$$

✓12800m³

Q14 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{4}{3}\right)\pi r^3$$

$$\text{Volume} = \left(\frac{4}{3}\right) \times \pi \times 14.5^3 = 12800\text{m}^3$$

✓4190m³

Q15 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{4}{3}\right)\pi r^3$$

$$\text{Volume} = \left(\frac{4}{3}\right) \times \pi \times 10.0^3 = 4190\text{m}^3$$

✓7610m³

Q16 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{4}{3}\right)\pi r^3$$

$$\text{Volume} = \left(\frac{4}{3}\right) \times \pi \times 12.2^3 = 7610\text{m}^3$$

✓1100m³

Q17 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{4}{3}\right)\pi r^3$$

$$\text{Volume} = \left(\frac{4}{3}\right) \times \pi \times 6.4^3 = 1100\text{m}^3$$

✓159cm³

Q18 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{1}{3}\right)\pi r^2 h$$

$$\text{Volume} = \left(\frac{1}{3}\right) \times \pi \times 3.9^2 \times 10.0 = 159\text{cm}^3$$

✓325m³

Q19 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{1}{3}\right)\pi r^2 h$$

$$\text{Volume} = \left(\frac{1}{3}\right) \times \pi \times 8.3^2 \times 4.5 = 325\text{m}^3$$

✓2220m³

Q20 · ● Secure · 4 marks

METHOD

$$\text{Volume} = \left(\frac{1}{3}\right)\pi r^2 h$$

$$\text{Volume} = \left(\frac{1}{3}\right) \times \pi \times 11.5^2 \times 16.0 = 2220\text{m}^3$$

✓613m²

Q21 · ● Greater Depth · 5 marks

METHOD

$$\text{Slant height, } l = \sqrt{r^2 + h^2}$$

$$l = \sqrt{268.49} = 16.39\text{m}$$

$$\text{Surface area} = \pi r l + \pi r^2$$

$$\text{Surface area} = (\pi \times 8.0 \times 16.39) + (\pi \times 8.0^2)$$

$$\text{Surface area} = 411.93 + 201.06 = 613\text{m}^2$$

✓13.5cm

Q22 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 10306.0 \div 4.189 = 2460.376$$

$$r = 2460.376^{1/3} = 13.5\text{cm}$$

✓8.5cm

Q23 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 2572.4 \div 4.189 = 614.115$$

$$r = 614.115^{1/3} = 8.5\text{cm}$$

✓787cm²

Q24 · ● Greater Depth · 5 marks

METHOD

$$\text{Slant height, } l = \sqrt{r^2 + h^2}$$

$$l = \sqrt{237.25} = 15.4\text{cm}$$

$$\text{Surface area} = \pi r l + \pi r^2$$

$$\text{Surface area} = (\pi \times 9.9 \times 15.4) + (\pi \times 9.9^2)$$

$$\text{Surface area} = 478.97 + 307.91 = 787\text{cm}^2$$

✓6.8m

Q25 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 1317.1 \div 4.189 = 314.434$$

$$r = 314.434^{1/3} = 6.8\text{m}$$

✓7.2cm

Q26 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 1563.5 \div 4.189 = 373.258$$

$$r = 373.258^{1/3} = 7.2\text{cm}$$

✓524m²

Q27 · ● Greater Depth · 5 marks

METHOD

$$\text{Slant height, } l = \sqrt{r^2 + h^2}$$

$$l = \sqrt{174.77} = 13.22\text{m}$$

$$\text{Surface area} = \pi r l + \pi r^2$$

$$\text{Surface area} = (\pi \times 7.9 \times 13.22) + (\pi \times 7.9^2)$$

$$\text{Surface area} = 328.1 + 196.07 = 524\text{m}^2$$

✓7.5m

Q28 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 1767.1 \div 4.189 = 421.864$$

$$r = 421.864^{1/3} = 7.5\text{m}$$

✓10.5m

Q29 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 4849.0 \div 4.189 = 1157.613$$

$$r = 1157.613^{1/3} = 10.5\text{m}$$

✓10.9m

Q30 · ● Greater Depth · 4 marks

METHOD

$$V = \left(\frac{4}{3}\right)\pi r^3$$

$$r^3 = V \div \left(\left(\frac{4}{3}\right)\pi\right) = 5424.6 \div 4.189 = 1295.028$$

$$r = 1295.028^{1/3} = 10.9\text{m}$$