teachably

GCSE Mathematics

Volume of Spheres, Cones & Pyramids

Mark Scheme - GCSE Maths Practice

M = method mark, A = accuracy mark (dependent on the preceding M mark), B = independent mark.

Edexcel-style questions

Q1 Grade 6 Edexcel style

Total: 2

Part	Mark scheme	Marks
(a)	$\frac{4}{3} \times \pi \times 6^3$	M1
(a)	288π cm³	A1

Q2 Grade 6 Edexcel style

Total: 2

Part	Mark scheme	Marks
(a)	$\frac{1}{3} \times 6^2 \times 8$	M1
(a)	96 cm³	A1

Q3 Grade 6 Edexcel style

Total: 2

Part	Mark scheme	Marks
(a)	$4 \times \pi \times 5^2$	M1
(a)	100π cm²	A1

Q4 Grade 6 Edexcel style

Total: 2

Part	Mark scheme	Marks
(a)	full sphere volume = $\frac{4}{3} \times \pi \times 6^3 = 288\pi$ cm³	M1
(a)	hemisphere volume = $288\pi \div 2 = 144\pi$ cm³	A1

Q5 Grade 7 Edexcel style

Total: 3

Part	Mark scheme	Marks
(a)	cone volume = $\frac{1}{3} \times \pi \times 3^2 \times 8 = 24\pi$ cm³	M1
(a)	hemisphere volume = $\frac{2}{3} \times \pi \times 3^3 = 18\pi$ cm³	M1
(a)	total volume = $24\pi + 18\pi = 42\pi$ cm³	A1

AQA-style questions

Q6 Grade 6 AQA style

Total: 2

Part	Mark scheme	Marks
(a)	$\frac{4}{3} \times 3.14 \times 3^3$	M1
(a)	113.04 cm³	A1

Q7 Grade 6 AQA style

Total: 3

Part	Mark scheme	Marks
(a)	base area = 5 × 8 = 40 cm²	M1
(a)	$\frac{1}{3} \times 40 \times 12$	M1
(a)	160 cm³	A1

Q8 Grade 6 AQA style

Total: 2

Part	Mark scheme	Marks
(a)	$4 \times 3.14 \times 4^2$	M1
(a)	200.96 cm²	A1

Q9 Grade 7 AQA style

Total: 3

Part	Mark scheme	Marks
(a)	$36\pi = \frac{4}{3} \times \pi \times r^3$	M1
(a)	$r^3 = 36 \times 3 \div 4 = 27$	M1
(a)	r = 3 cm	A1

Q10 Grade 8 AQA style

Total: 4

Part	Mark scheme	Marks
(a)	volume of one marble = $\frac{4}{3} \times \pi \times 1.5^3 = 4.5\pi$ cm³	M1
(a)	total volume of 8 marbles = $8 \times 4.5\pi = 36\pi$ cm³	M1
(a)	$36\pi = \frac{1}{3} \times \pi \times 3^2 \times h$	M1
(a)	$h = 36 \times 3 \div 9 = 12$ cm	A1

OCR-style questions

Q11 Grade 6 OCR style

Total: 2

Part	Mark scheme	Marks
(a)	$\frac{1}{3} \times \pi \times 6^2 \times 10$	M1
(a)	120π cm³	A1

Q12 Grade 7 OCR style

Total: 3

Part	Mark scheme	Marks
(a)	base area = ½ × 6 × 8 = 24 cm²	M1
(a)	$\frac{1}{3} \times 24 \times 9$	M1
(a)	72 cm³	A1

Q13 Grade 7 OCR style

Total: 3

Part	Mark scheme	Marks
(a)	curved surface area = $\pi \times 3 \times 5 = 15\pi$ cm²	M1
(a)	base area = $\pi \times 3^2 = 9\pi$ cm²	M1
(a)	total = $15\pi + 9\pi = 24\pi$ cm²	A1

Q14 Grade 7 OCR style

Total: 2

Part	Mark scheme	Marks
(a)	$100\pi = \frac{1}{3} \times \pi \times 5^2 \times h$	M1
(a)	$h = 100 \times 3 \div 25 = 12$ cm	A1

Q15 Grade 8 OCR style

Total: 3

Part	Mark scheme	Marks
(a)	setting the volumes equal: $\frac{4}{3} \times \pi \times r^3 = \frac{1}{3} \times \pi \times r^2 \times h$	M1
(a)	dividing both sides by $\frac{1}{3} \times \pi \times r^2$: $h = 4r$	M1
(a)	with r = 5 cm, h = 4 × 5 = 20 cm	A1

Teachably-style questions

Q16 Grade 6 Teachably style — Total: 2

Part	Mark scheme	Marks
(a)	$\frac{1}{3}$ × 3.14 × 4² × 9	M1
(a)	150.72 cm³	A1

Q17 Grade 7 Teachably style — Total: 3

Part	Mark scheme	Marks
(a)	base area = 5² = 25 cm²	M1
(a)	100 = $\frac{1}{3}$ × 25 × h	M1
(a)	h = 100 × 3 ÷ 25 = 12 cm	A1

Q18 Grade 7 Teachably style — Total: 3

Part	Mark scheme	Marks
(a)	slant height = $\sqrt{6^2 + 8^2}$ = $\sqrt{100}$ = 10 cm	M1
(a)	3.14 × 6 × 10	M1
(a)	188.4 cm²	A1

Q19 Grade 8 Teachably style — Total: 3

Part	Mark scheme	Marks
(a)	curved surface area = 2 × 3.14 × 7² = 307.72 cm²	M1
(a)	flat circular face = 3.14 × 7² = 153.86 cm²	M1
(a)	total = 307.72 + 153.86 = 461.58 cm²	A1

Q20 Grade 8 Teachably style — Total: 4

Part	Mark scheme	Marks
(a)	the cylinder has radius 6 cm and height 12 cm (the sphere's diameter)	M1
(a)	cylinder volume = π × 6² × 12 = 432π cm³	M1
(a)	sphere volume = $\frac{4}{3}$ × π × 6³ = 288π cm³	M1
(a)	empty space = 432π - 288π = 144π cm³	A1

END OF PAPER