GCSE MATHEMATICS · HIGHER

Targeting Grade 9

Paper 6 · Mark scheme · Calculator · 40 marks

M method mark **P** process mark **A** accuracy mark (depends on the M or P marks before it)
B independent mark **C** communication mark **ft** follow through **oe** or equivalent

Q	Working	Answer	Mark	Notes
1	Value after 1 year $= 24\,000 \times 0.85 = 20\,400$		P1	
	$20\,400 \times m^2 = 13\,056$		P1	m = yearly multiplier
	$m^2 = 0.64 \Rightarrow m = 0.8$		P1	
		20	A1	

Q	Working	Answer	Mark	Notes
2	Volumes a and b: $8.4a + 2.7b = 6.3(a + b)$		P1	Total mass = density × total volume
	$2.1a = 3.6b$		P1	
	$a : b = 3.6 : 2.1$		P1	
		$12 : 7$	A1	

Q	Working	Answer	Mark	Notes
3	L: 2.45 and 2.55; g: 9.805 and 9.815		B1	Both pairs of bounds
	Upper bound $T = 2\pi\sqrt{\frac{2.55}{9.805}} = 3.204\ldots$		M1	UB L with LB g
	Lower bound $T = 2\pi\sqrt{\frac{2.45}{9.815}} = 3.139\ldots$		M1	LB L with UB g
	Both round to 3 (1 s.f.); they do not agree to 2 s.f.		C1	
		3	A1	

Q	Working	Answer	Mark	Notes
4	Volume of sphere $= \frac{4}{3}\pi \times 6^3 = 288\pi$		P1	
	$\pi r^2 \times 3r = 288\pi \Rightarrow r^3 = 96$		P1	
	$r = 4.578\ldots$		P1	
	Surface area $= 2\pi r^2 + 2\pi r \times 3r = 8\pi r^2$		P1	
		527	A1	526.9...

Q	Working	Answer	Mark	Notes
5	$\sin\frac{1}{2}\theta = \frac{7}{10} \Rightarrow \theta = 88.85\ldots°$		M1	Angle AOB (or cosine rule)
	Sector $= \frac{88.85\ldots}{360} \times \pi \times 10^2 = 77.54\ldots$		M1	
	Triangle $= \frac{1}{2} \times 10^2 \times \sin 88.85\ldots° = 49.99\ldots$		M1	
	$77.54\ldots - 49.99\ldots$		M1	
		27.5	A1	

Q	Working	Answer	Mark	Notes
6(a)	Angle $PQR =$ $180° - 70° - (180° - 160°) = 90°$		M1	Correct angle with reason (e.g. co-interior angles)
	$PR = \sqrt{12^2 + 9^2}$	15	A1	
6(b)	Angle $QRP = \tan^{-1}\left(\frac{12}{9}\right) =$ $53.1\ldots°$		M1	
	Bearing of Q from $R = 160° + 180° = 340°$		M1	
	$340° - 53.1\ldots°$		M1	
		287	A1	

Q	Working	Answer	Mark	Notes
7	N is the midpoint of BC, directly below M: $MN = 5$		P1	
	$AN^2 = 8^2 + 3^2 = 73$		P1	
	$AN = \sqrt{73} = 8.544\ldots$		P1	
	$\tan\theta = \dfrac{5}{\sqrt{73}}$		P1	
		30.3	A1	

Q	Working	Answer	Mark	Notes
8	Surface area $= \pi r(2.6r) + 2\pi r^2 = 4.6\pi r^2$		P1	Curved cone + curved hemisphere only
	$4.6\pi r^2 = 115\pi \Rightarrow r = 5$		P1	
	Height of cone $= \sqrt{13^2 - 5^2} = 12$		P1	
	Volume $= \frac{1}{3}\pi \times 5^2 \times 12 + \frac{2}{3}\pi \times 5^3$		P1	
	$= 100\pi + \frac{250}{3}\pi$		P1	
		576	A1	575.9...
		Total	**40**	