GCSE MATHEMATICS · HIGHER

Targeting Grade 9

Paper 2 · 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	Area bounds: 84.5 and 85.5; length bounds: 12.35 and 12.45		B1	Both pairs of bounds
	Lower bound of width $= \frac{84.5}{12.45} = 6.787\ldots$		M1	LB area ÷ UB length
	Upper bound of width $= \frac{85.5}{12.35} = 6.923\ldots$		M1	UB area ÷ LB length
	Both round to 7 (1 s.f.) but not to the same value to 2 s.f.		C1	Reason must refer to both bounds
		7	A1	

Q	Working	Answer	Mark	Notes
2	Multiplier for 3 hours $= \frac{6083}{5408} = 1.1248\ldots$		P1	
	Hourly multiplier $= \sqrt[3]{1.1248\ldots} = 1.04$		P1	
	Start $= \frac{5408}{1.04^2}$		P1	
		5000	A1	

Q	Working	Answer	Mark	Notes
3	Area scale factor $= \frac{384}{150} = 2.56$; length scale factor $= 1.6$		P1	
	Volume (mass) scale factor $= 1.6^3 = 4.096$		P1	
	$4.096m - m = 2560 \Rightarrow 3.096m = 2560$		P1	Works in grams or kg consistently
		827	A1	826.87... rounded

Q	Working	Answer	Mark	Notes
4(a)	Area of bar $0 < t \leqslant 10$ represents 12 people, so frequencies are 12, 24, 30, 30, 12		P1	Uses area to find the scale (1 unit of fd $= 1$ person per minute)
	$\frac{1}{2} \times 30 + \frac{1}{2} \times 30$		P1	Half of each of the two classes
		30	A1	
4(b)	Total $= 108$; more than 50 minutes: 12 people		P1	
	$\frac{12}{108} \times \frac{11}{107}$		P1	Without replacement
		$\frac{11}{963}$	A1	oe, e.g. 0.0114

Q	Working	Answer	Mark	Notes
5(a)	$u_2 = 2k + 3$ $u_3 = k(2k + 3) + 3 = 23$ $2k^2 + 3k - 20 = 0 \Rightarrow$ $(2k - 5)(k + 4) = 0$	 $k = 2.5,\ k = -4$	M1 M1 M1 A1	
5(b)	8, 23, 60.5, 154.25, 388.625, 974.5625, 2439.40625	 2439.40625 (the 8th term)	M1 A1	Continues the sequence with $k = 2.5$

Q	Working	Answer	Mark	Notes
6	Sector $= \frac{50}{360}\pi r^2$, triangle $= \frac{1}{2}r^2 \sin 50°$ $\frac{50}{360}\pi r^2 - \frac{1}{2}r^2 \sin 50° = 10$ $0.05331\ldots r^2 = 10$ $r^2 = 187.58\ldots$	 13.7	M1 M1 M1 M1 A1	

Q	Working	Answer	Mark	Notes
7	$OM = 5$ cm (half the side of the square)		P1	O is the centre of the base
	$VM = \sqrt{13^2 - 5^2} = 12$ cm		P1	Pythagoras in triangle VMB
	Triangle VOM is right-angled at O		P1	
	$\cos\theta = \frac{5}{12}$		P1	Or $VO = \sqrt{119}$ and $\tan\theta = \frac{\sqrt{119}}{5}$
		65.4	A1	

Q	Working	Answer	Mark	Notes
8	Let $BC = x$: $7^2 = 9^2 + x^2 - 2 \times 9 \times x \cos 40°$		M1	Cosine rule (or sine rule for angle C)
	$x^2 - 13.788\ldots x + 32 = 0$		M1	
	$x = \frac{13.788\ldots \pm \sqrt{62.13\ldots}}{2}$		M1	Or $C = 55.7°$ **and** $C = 124.3°$
		10.8	A1	
		2.95	A1	
		Total	**40**	