2009 Mathematics SG – Credit Level – Paper 2

Marking Instructions

Award marks in whole numbers only

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
1	**Ans:** 3.1×10^{24} • method • processing • rounding	• $\frac{1000}{3.27\times10^{-22}}$ • 3.058×10^{24} • 3.1×10^{24} **3KU**

NOTES:

(i) 3.1×10^{24} with or without working — award 3/3

(ii) 3.06×10^{24} with or without working — award 2/3

(iii) $3.058\times10^{24} \rightarrow 3.05\times10^{24}$ — award 2/3

(iv) 3.05×10^{24} without working — award 1/3

(v) $1000\times3.27\times10^{-22} \rightarrow 3.3\times10^{-19}$ — award 1/3

(vi) 3.1×10^{n} $[n = 21, 22, 23]$ without working — award 1/3

(vii) 3.3×10^{-19} without working — award 0/3

(viii) for any other final answer, an unrounded solution must be stated to access the 3rd mark

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	**Ans: 8** • valid strategy • processing • processing a division • solution	 • knows to use $\pi r^2 h$ • $\pi \times 3^2 \times 8 \left(= 226.19\right)$ • $\frac{2000}{72\pi} \left(= 8.84\right)$ • 8 (rounding down) **4RE**

NOTES:

(i) the second mark is available only for a calculation involving π **and** h

(ii) the 3rd mark is available for

either: explicit evidence of division of 2000

or: implicit evidence (unrounded consistent value)

(iii) the final mark is available for an answer consistent with the division (unrounded answer need not be stated)

(iv) if no rounding is required, the final mark cannot be awarded

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3	**Ans: - 1.2, 5.2** • method • processing • solution • rounding	 • substitution into quadratic formula • $\sqrt{40}$ • -1.162, 5.162 • - 1.2, 5.2 **4KU**

NOTES:

alternative evidence for 3rd and 4th marks

(i) 3rd mark (one solution and rounding) -1.162 → -1.2
4th mark (another solution and rounding) 5.162 → 5.2

(ii) only the first mark is available for candidates who process to a negative discriminant

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
4	**Ans: 112.5 cm^2** • linear scale factor • area scale factor • solution	 • $\frac{10}{4}$ or $\frac{4}{10}$ • $\left(\frac{5}{2}\right)^2$ or $\left(\frac{2}{5}\right)^2$ • 112.5 **3KU**

NOTES:

(i) for 112.5 with or without working — award 3/3

(ii) for 45 with or without working — award 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
5	**Ans: £372, £74** • mean • standard deviation	• 372 • 74 **2RE**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6 (a)	**Ans:** $y = 2x + 3$ • gradient • y-intercept • gradient or intercept in equation • linear equation	 • 2 • $(c =)3$ • $y = 2x \cdots$ or $y = \cdots + 3$ • $y = 2x + 3$ **4KU**
Notes: (i) for a correct equation without working award 4/4 (ii) where the gradient and/or y-intercept are wrong, but explicitly stated, the 3rd and 4th marks are still available		
(b)	**Ans: 43** • substitution • evaluation	 • $2 \times 20 + 3$ • 43 **2RE**
Notes: (i) for 43 with or without working award 2/2		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7 (a)	**Ans:** $t = \frac{k}{d^2}$ • statement of variation • formula	• $t \propto \frac{1}{d^2}$ • $t = \frac{k}{d^2}$ **2KU**
Notes: (i) evidence for the 2nd mark may appear in part (b) (ii) for any wrong variation, the 2nd mark may still be available		
(b)	**Ans:** **8°C** • substitution • evaluating k • processing	• $50 = \frac{k}{2^2}$ • $k = 200$ • 8 **3KU**
Notes: (i) a maximum of $\frac{2}{3}$ is available for (a) direct variation (b) $t \propto \frac{1}{d}$		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark	
8	**Ans: no, plus justification** • multiplying factor • power of 3 • process • communication	or • 0.8 • 0.8^3 • 0.512 • no, because 51.2% > 50%	20% 3 years 46.08 no, because 46.08 > 45 **4RE**
NOTES: (i) for 'simple' depreciation, only the final mark is available			

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9 (a)	**Ans: 20°** • solution	• 20° **1KU**
NOTES:		
(b)	**Ans: 55.6 m** • strategy • substitution/processing • solution	• use of sine rule cosine rule median and right angled triangle • correct application of valid strategy • 55.6 **3 RE**
NOTES: (i) accept solutions in radians or gradians (ii) for any attempt involving right angled trigonometry in ΔABC award 0/3		
(c)	**Ans: 312°** • strategy • process	• one of $180^\circ + 80^\circ$ $180^\circ + 52^\circ$ $52^\circ + 80^\circ$ • 312° **2RE**
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10	**Ans: 10 years** • substitution • process • factorisation • solution	 • $83 = \cdots$ • $M^2 - 4M - 60 = 0$ • $(M - 10)(M + 6) = 0$ • 10 **4RE**

NOTES:

(i) if -6 is included in the final solution, the 4th mark cannot be awarded

(ii) for an answer of 10 without working award 1/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11(a)	**Ans:** $2042\ \text{cm}^2$ • strategy • processing • solution	 • $\frac{260}{360}$ • $\frac{260}{360}\times\pi\times30^2$ • 2042 **3KU**
Notes: (i) $\frac{100}{360}$ can be awarded the 1st mark only within the strategy $\pi r^2-\frac{100}{360}\pi r^2$		
(b)	**Ans: 136.1 cm** • strategy • process • process	 • circumference of base = length of arc • $C=\frac{260}{360}\times\pi\times60$ • 136.1 **3RE**
Notes: (i) calculating **only** $C=\pi\times60$ award 0/3		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
12 (a)	**Ans: 210** • value	• 210 **1KU**
NOTES:		
(b)	**Ans: proof** • method • proof	• $\frac{1}{2}(n+1)(n+2)$ • $\frac{1}{2}(n^2+3n+2)$ **2RE**
Notes: (i) for verifying formula for specific values		award 0/2
(c)	**Ans: proof** • strategy • factorising	• $\frac{1}{2}n(n+1)+\frac{1}{2}(n^2+3n+2)$ • $(n+1)(n+1)$ **2RE**
Notes: (i) for verifying formulae for specific values		award 0/2

KU 24 marks
RE 28 marks

[END OF PAPER 2 MARKING INSTRUCTIONS]

Final	**KU 45**
Totals	**RE 45**