2006 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: $3 \cdot 12 \times 10^8$ km** • substitution • calculation • scientific notation	 • $\pi \times 2 \times 4 \cdot 96 \times 10^7$ • 311 645 991 • $3 \cdot 12 \times 10^8$ 3 KU

Notes:

(i) Allow legitimate variations for π.

(ii) For $3 \cdot 12 \times 10^8$ without working, award 3/3

(iii) For $1 \cdot 56 \times 10^8$ without working, award 2/3

(iv) For $7 \cdot 73 \times 10^{15}$ without working, award 2/3

(v) For any other incorrect answer, the third mark is only available if that answer has first been expressed in full.

(vi) For any other answer without working, award 0/3

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
2 (a)	**Ans: 76·5, 6·75** • mean • method • process/solution	• 76·5 • $\sqrt{\frac{35341 - \frac{459^2}{6}}{5}}$ or equivalent • 6·75 3 KU
Notes: (i) An answer without working which can be rounded to 6·75 may be awarded the 2nd and 3rd marks.		
(b)	**Ans: valid comments** • comparing means • comparing standard deviations	• the children's pulse rates tend to be higher • there is less variation in the children's pulse rates 2 RE
Notes: (i) Statements must show understanding of the concept. eg: "children have a higher pulse rate" is acceptable <u>but</u> "children have a higher mean" is not acceptable.		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
3	**Ans: £300** • valid strategy • process • solution	• 108% = 324 • division by 1·08 • 300 3 KU
Notes: (i) For £300 without working award 3/3 (ii) For £298.08 (324 × 0·92) with or without working award 0/3 (iii) For £349.92 (324 × 1·08) with or without working award 0/3		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
4 (a)	**Ans:** $\mathbf{3x^2 + 11x - 4}$ • expression	• $3x^2 + 11x - 4$ 1 KU
Notes:		
(b)	**Ans:** $\mathbf{2m^{\frac{1}{2}} + m^{\frac{5}{2}}}$ • first term • second term	• $2m^{\frac{1}{2}}$ • $m^{\frac{5}{2}}$ 2 KU
Notes:		
(c)	**Ans:** $\mathbf{\sqrt{5}}$ • simplifying surd • subtraction	• $\sqrt{20} = 2\sqrt{5}$ • $\sqrt{5}$ 2 KU
Notes:		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
5	**Ans: 11·3º** • valid strategy • process • valid strategy • solution	• use of Pythagoras • 10 • use of trigonometry • 11·3º 4 KU

Notes:

(i) When MR is taken as 12 instead of 6, MS is 14·42 and the required angle is 7·89°. This may be awarded 3/4 (marks 1, 3 and 4)

(ii) Candidates who use MS = 8 may be awarded the last two marks for

- $\tan x = \frac{2}{8}$
- 14°

(iii) Do not penalise candidates who work in radians or grads.

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
6 (a)	**Ans: 124º** • strategy • consistent solution	• $\angle BCN = 50^\circ$ • 124º 2 RE
Notes: (i) For an answer of 124º with or without working award 2/2. (ii) Any other answer must be consistent with working to obtain the second mark.		
(b)	**Ans: 305 m** • strategy • substitution • solution • consistent rounding	• appropriate use of cosine rule • $b^2 = 110^2 + 230^2 - 2 \times 110 \times 230 \cos 124^\circ$ • 305·44 • 305 4 RE
Notes: (i) Within the correct solution, 305·44 need not be stated to gain full marks. (ii) For a wrong answer, the final mark is awarded only for an explicit rounding. (iii) Evaluating 14400 cos 124º loses the last two marks. (iv) Do not penalise candidates who work in radians or grads.		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
7 (a)	**Ans: 504 cm^3** • solution	• 504 1 KU
Notes:		
(b)	**Ans: 327 cm** • stating radius • consistent substitution • rearranging • solution	• 0·7 cm • $504 = \pi \times 0 \cdot 7^2 \times h$ • $\frac{504}{\pi \times 0 \cdot 7^2}$ • 327 cm 4 RE

Notes:

(i)

Radius	Volume	Length	Award
7 mm	504 000	3274 (mm)	4/4
7 mm	5040	32·7 (mm)	3/4
14 mm	504 000	818·5 (mm)	3/4
1·4 cm	504	81·85 (cm)	3/4

(ii) For candidates who use πd , marks 1 and 2 are not available.

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
8	**Ans: 2230 grams** • valid strategy • length of arc • scaling • solution	• $\frac{284}{360}$ • 44·6 • knowing to $\div 2$ and $\times 100$ • 2230 4 RE
Notes: (i) Last mark can be awarded only if calculation involves π.		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
9 (a)	**Ans: 14** • substitution • solution	• $\frac{1}{2}\times 7\times(7-3)$ • 14 2 KU
Notes: (i) For an answer of 14 without working award 2/2.		
(b)	**Ans: proof** • equating • rearranging	• $65=\frac{1}{2}n(n-3)$ • $n^2-3n-130=0$ 2 RE
Notes:		
(c)	**Ans: 13** • factorising • solving • rejecting negative value	• $(n-13)(n+10)$ • 13, -10 • 13 3 RE
Notes: (i) The second mark is awarded only when both answers are shown. (ii) When the given quadratic produces two invalid solutions, the 3rd mark may be awarded for a statement such as "no such polygon exists". (iii) For an answer of 13 justified by substitution award 1/3. (iv) For an answer of 13 without working award 0/3.		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
10 (a)	**Ans: 3·87 metres** • substitution • solution	• $-31\cos 20^{o} + 33$ • 3·87 2 KU
Notes: (i) For an answer of 3.87 with or without working award 2/2.		
(b)	**Ans: 150·6 seconds** • equation • rearranging • solution	• $60 = -31\cos t^{\circ} + 33$ • $\cos t^{\circ} = -\frac{27}{31}$ • 150·6 3 RE
Notes: (i) If 31 cost t° is used in part (a) there is no further penalty in part (b).		
(c)	**Ans: 209·4 seconds** • consistent solution	• 209·4 1 RE
Notes: (i) Solution must be consistent with part (b).		

Question No	Give 1 mark for each	Illustrations of evidence for awarding each mark
11(a)	**Ans:** $(3+x)$**cm** • expression	• $3+x$ 1 RE
Notes:		
(b)	**Ans: proof** **Method 1:** • strategy • cross-multiplication • proof	• $\frac{PQ}{8}=\frac{3+x}{6}$ • $6PQ=8(3+x)$ • $4+\frac{4}{3}x$
	Method 2: • strategy • application • proof	• Scale Factor $=\frac{3+x}{6}$ • $\left(\frac{3+x}{6}\right)\times 8$ • $4+\frac{4}{3}x$
	Method 3: • strategy • application • communication	• substitution of $4+\frac{4}{3}x$ into a correct equation • cross-multiplication • $PQ=4+\frac{4}{3}x$ 3 RE
Notes:		

KU 23 marks
RE 29 marks

Final KU 45
Totals RE 45

[END OF PAPER 2 MARKING INSTRUCTIONS]