2012 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: 3.03 million	
	• multiplying factor	• 1.04
	• power of 3	• $1 \cdot 04^3$
	• solution	• 3 025 884
	• rounding	• 3.03 million
		4KU
NOTES:		
(i)	for 3 030 000, with or without working	award 4/4
(ii)	for 2 380 000 ($\times 0.96^3$), with or without work	king award 3/4
(iii)	for 3.03, with or without working	award 3/4
(iv)	for 3 010 000 $(2 \cdot 69 \times 1 \cdot 12)$, with or without v	working award 1/4
(v)	for 8 390 000, with or without working	award 0/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2 (a)	Ans: 14 • SIQR	• 14 1KU
(b)	Ans: two valid statements	
	• one valid comparison	• on average the <u>number</u> of sit-ups per athlete has risen
	• a second valid comparison	• the number of sit-ups is less varied
		2RE
NOTES:		
(i)	other valid statements could compare	
	least number of sit-upsgreatest number of sit-ups	
(ii)	since numerical comparisons are not required	d, do not penalise numerical inaccuracies
(ii)	as a comparison between performances/sit-up	ps is required do <u>not</u> accept
	 everyone could do more sit-ups after tra the median is higher the range is smaller 	ining

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3	Ans: 5 litres	
	Method 1	
	• strategy (area of cross section)	• $(28 \times 20) + \left(\frac{1}{2} \times 20 \times 4 \cdot 5\right)$ (605)
	• strategy (volume of prism)	• $\left[\left(28 \times 20 \right) + \left(\frac{1}{2} \times 20 \times 4 \cdot 5 \right) \right] \times 9$
	• all calculations correct	• 5445
	• correct rounding	• 5 4KU
	Method 2	
	• strategy (volume of cuboid)	• 9 × 20 × 28 (5040)
	• strategy (volume of triangular prism)	• $9 \times \left[\frac{1}{2} \times 20 \times 4 \cdot 5\right]$ (405)
	all calculations correct	• 5445
	• correct rounding	• 5 4KU
	Method 3	
	• strategy (volume of extended cuboid)	• $9 \times 20 \times 32.5$ (5850)
	• strategy (volume of triangular prism)	• $9 \times \left[\frac{1}{2} \times 20 \times 4 \cdot 5\right]$ (405)
	• all calculations correct	• 5445
	correct rounding	• 5 4KU
NOTES:		
(i)	for candidates who calculate $28 \times 9 \times 20 \times 3$	2.5, only the final mark is available

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
4	Ans: 2·61m • ratio	• $\frac{65}{360}$ or $\frac{360}{65}$
	• strategy	• $\frac{65}{360} \times \pi \times 4 \cdot 6$ or $\pi \times 4 \cdot 6 \div \frac{360}{65}$
	• all calculations correct	• 2.609
		3KU
NOTES:		
(i) for	r 2.61 with or without working	award 3/3
(ii) fo	$r 1 \cdot 3 (\times \pi \times 2 \cdot 3)$	award 2/3
(iii) fo	$r 3 \cdot 0 (\times \pi \times 2 \cdot 3^2)$	award 1/3
(iv) the	e 3 rd mark is available only for a calculation inv	olving π

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
5	Ans: 40 cm	
	• valid strategy	• $d \propto \frac{v}{r^2}$ or $d = \frac{kv}{r^2}$
	• substitution	• $50 = \frac{k \times 60\ 000}{20^2}$
	• processing	• $k = \frac{1}{3}$
	• solution	• 40
		4 KU
NOTES:		
(i)	for 50 $\left(d \propto \frac{v}{r}\right)$	award 3/4
(ii)	for 56 $\left(d \propto \frac{v}{\sqrt{r}}\right)$	award 3/4
(iii)	for 97.7 $(d \propto vr^2)$	award 2/4
(iv)	for 62.5 $\left(d \propto \frac{r^2}{v}\right)$	award 2/4
(v)	for 78 $(d \propto vr)$	award 1/4
(vi)	accept an answer of 36 coming from $k = 0.3$	

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
6	Ans: £860	
	• valid strategy	• $104\% = 894.40$
	• processing	• $1\% = \frac{894.4}{104}$ or similar
	• solution	• 860
		3 KU
NOTES:		
(i)	for 860 with or without working	award 3/3
(ii)	for $931.67 (96\% = 894.4)$ with or without work	king award 2/3
(iii)	for $930.17 (104\% \text{ of } 894.4)$ with or without we	orking award 0/3
(iv)	for 858.62 (96% of 894.4) with or without wor	rking award 0/3
(v)	CAUTION: Some candidates state $104\% = 89$ (iii) or (iv); in these cases, the 1^{st} mark is still a	94.40 and follow this as note available
(vi)	for candidates who ignore the initial 40p (lead mark available is 2/3	ing to 859.62), the maximum

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
7	Ans: 18·3 metres	
	Method 1	
	• strategy	• $\sin 59^\circ = \frac{x}{8}$
	• processing	• $x = 6.86$
	• processing	• $\sin 22^\circ = \frac{6.86}{BC}$
	• solution	• BC = 18.3
	Method 2	
	• strategy	• $\angle BAC = 121^{\circ}$
	• strategy	• $\frac{a}{\sin 121^\circ} = \frac{8}{\sin 22^\circ}$
	• processing	• $a = \frac{8 \sin 121^{\circ}}{\sin 22^{\circ}}$
	• solution	• $a = 18.3$
		4RE
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
8	 Ans: 15 cm² linear scale factor area scale factor 	• $\frac{4}{0 \cdot 8}$ • $\left(\frac{4}{0 \cdot 8}\right)^2 = 25$
	• solution	• 15 3KU
NOTES:		
(i)	for a final answer of $3\left(\frac{4}{0\cdot 8} \times 0 \cdot 6\right)$	award 1/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9	Ans: 1503.5 cm ²	
	METHOD 1	
	• valid strategy	• $\frac{1}{2} ab \sin C$
	• substitution	• $\frac{1}{2} \times 40 \times 40 \times \sin 110^{\circ}$
	• processing	• 751.75
	• solution	• 1503.5
		4RE
NOTES:		
(i) e	evidence for the 1 st mark may be implicit in the	substitution
	Ans: 1503.5 cm ²	
	METHOD 2	
	diagonal calculation	• 65.5 (one diagonal)
	diagonal calculation	• 45.9
	• chosen strategy	• $\frac{1}{2}$ × product of diagonals
	• solution	• 1503.5 4RE
NOTES: (i)	evidence for 3 rd mark may be implicit in the fin	al mark
	Ans: 1503.5 cm ²	
	METHOD 3	
	• base calculation	• 22.95
	• height calculation	• 32.75
	• area of one triangle	• 375.875
	• solution	• 1503·5 4RE
GENERAL NOTE:		
í	for all methods an answer of 1503.5 with no we	orking award 0/4

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
10 (a)	Ans: $f = 1.2d + 1.8$	
	• gradient	• 1.2
	• <i>y</i> -intercept	• 1.8
	• linear equation	• $f = 1 \cdot 2d + 1 \cdot 8$
		3KU
NOTES:		
(i) t	for a correct equation without working	award 3/3
(ii) y	where the gradient and/or y-intercept are wrong mark is still available	, but explicitly stated, the 3 rd
(b)	Ans: £10·20	
	• substitution	• $1 \cdot 2 \times 7 + 1 \cdot 8$
	• evaluation	• 10.2(0)
		2RE
NOTES:		
(i) 1	for $10.2(0)$ with or without working	award 2/2

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
11(a)	Ans: 7-38 metres	
	• valid strategy	• $AC^2 = 6 \cdot 2^2 + 4^2$
	• calculation	• 7.38
		2KU
(b)	Ans: $73 \cdot 8^{\circ}$	
	• valid strategy	• cosine rule
	• substitution into valid formula	• $\cos D = \frac{5^2 + 7^2 - 54 \cdot 44}{2 \times 5 \times 7}$
	• processing	• $\cos D = 0 \cdot 279 \cdots$
	• solution	• 73 · 8°
		4RE
NOTES:		
(i) (i)	evidence for the 1 st mark may be implicit in the	substitution

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
12 (a)	Ans: -3	
	• evaluating	• -3
		1KU
NOTES:		
(b)	Ans: $11 \cdot 5^{\circ}, 168 \cdot 5^{\circ}$	
	• equation	• $3\sin t^\circ = 0.6$
	• beginning to solve	• $\sin t^\circ = 0 \cdot 2$
	• first solution	• 11.5°
	• second solution	• 168 · 5°
		4RE
NOTES:		
(i) the 2^{nd} angle must be consistent with the 1^{st} angle		
(ii) candidates who start with $\sin t^{\circ} = 0.6$ may be awarded only the final two marks		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
13 (a)	Ans: proof	
	• beginning proof	• $\frac{2x}{x^2+5} = \frac{6}{18}$ or $3 \times 2x = x^2 + 5$
	• processing	$\bullet x^2 - 6x + 5 = 0$
		2RE
NOTES:		

(i) working for part (a) may appear in part (b)

(b)	Ans: 5	
	• correct use of algebraic strategy	• $(x-1)(x-5)=0$
	• solving	• $x=1, x=5$
	• solution	• <i>x</i> =5

NOTES:

(i) for 5 with no working award 0/3
(ii) final answer must satisfy all given conditions
(iii) working for part (b) may appear in part (a)
(iv) accept use of quadratic formula

KU 28 marks RE 25 marks

3RE

[END OF PAPER 2 MARKING INSTRUCTIONS]

FinalKU 45TotalsRE 45