2010 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: 35 400 tonnes			
	• multiplying factor	• 0.75		
	• power of 3	• 0.75^3		
	• solution	• 35 437.5		
	• rounding	• 35 400		
		4KU		
NOTES:				
(i)	for 35 400, with or without working	award 4/4		
(ii)	for 1310, with or without working $(\times 0 \cdot 25^3)$	award 3/4		
(iii)	for 164 000, with or without working $(\times 1.25^{\circ})$	award 3/4		
(iv)	for 21 000, with or without working	award 0/4		
	For any other final answers			
(v)	the 3 rd mark is for an unrounded answer			
(vi)	the last mark is for correctly rounding the num	ber given for the 3 rd mark		
(vii)	candidates who do not give an unrounded num	ber cannot be awarded the last two marks		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
2	Ans: $x^3 - 2x^2 + x$	
	• correct expansion of $x(x-1)$ or $(x-1)^2$	• $x^2 - x$ or $x^2 - x - x + 1$
	• further expansion and simplification	• $x^3 - 2x^2 + x$ 2KU
NOTES:		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
3 (a)	Ans: 101, 1.69	
	calculating mean	• 101
	• starting to calculate standard deviation	• as far as 20 or 81 628
	• standard deviation	• 1·69 3KU

NOTES:

								$(\Sigma r)^2$
	x	$x - \overline{x}$	$(x-\overline{x})^2$		x^2	$\sum (x)$	$(\overline{x}-\overline{x})^2$	$\sum_{n=1}^{\infty} \frac{\sum x^2 - \frac{(\sum x)}{n}}{n}$
	101	1	1		10404	$s = \sqrt{\frac{1}{n}}$	i-1	$s = \sqrt{n-1}$
	102	1	1		10404	$\overline{20}$		808 ²
ļ	101	0	0		10201	$=\sqrt{\frac{20}{7}}$		$81628 - \frac{300}{8}$
	98	-3	9		9604	V /		$=\sqrt{\frac{8}{7}}$
ļ	99	-2	4		9801	$=\sqrt{2\cdot 8}$	57	/2.057
	101	0	0		10201	=1.69		$=\sqrt{2}\cdot 857$
ļ	103	2	4		10609			=1.69
	102	1	1		10404			
			20		81628			
	(b)	Ans:	two valid	statemen	ts			
		• con	nparing mea	ans		• the se numb	cond sau er of pin	nple has on average, a greater is per box
		• con	nparing star	idard devi	ations	• the se in the	cond sau number	nple has a greater variability of pins per box
								2RE

NOTES:

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark			
4	Ans: -2.6, 0.9				
	• method	• substitution into quadratic formula			
	• processing	• $\sqrt{109}$			
	• solution	• -2·573, 0·907			
	• rounding	• -2·6, 0·9 4KU			
NOTES:					
alter	native evidence for 3 rd and 4 th marks				
(i)	3 rd mark (one solution and rounding) 4 th mark (another solution and rounding)	$\begin{array}{ccc} -2.573 \rightarrow & -2.6 \\ 0.907 \rightarrow & 0.9 \end{array}$			
(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
5 (a)	Ans: 0.866 m	
	• method	• $1^2 = x^2 + 0 \cdot 5^2$
	• solution	• $x = 0 \cdot 866 \cdots$
		2RE
NOTES:		
(b)	Ans: $1 \cdot 57 \text{ m}^3$	
	• process – area of cross section	• $0 \cdot 5 \times 0 \cdot 5 \times 0 \cdot 866 + 0 \cdot 5 \times (2 - 0 \cdot 866)$
	• process – volume of prism	• 0.7835×2
	• all calculations correct	• 1.567
	OR	
	• process – volume of cuboid	• $0 \cdot 5 \times 1 \cdot 134 \times 2 = 1 \cdot 134$
	 process – volume of prism added to volume of cuboid 	• $0 \cdot 5 \times 0 \cdot 5 \times 0 \cdot 866 \times 2 + 1 \cdot 134$
	• all calculations correct	• 1·567 3RE
NOTES:	1	

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark		
6	Ans: 88.0 cm			
	• fraction of circumference	• $\frac{140}{360}$		
	• use of formula	• $\frac{140}{360} \times \pi \times 72$		
	• all calculations correct	• 87·96 3KU		
NOTES:		<u> </u>		
(i)	for 87.96 with or without working	award 3/3		
(ii)	for 1583.36 from $\frac{140}{360} \times \pi \times 36^2$	award 2/3		
(iii)	the 3 rd mark is available only for a calculation	n involving π		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark		
7	Ans: 24 cm			
	• volume scale factor	• 8 or equivalent		
	• linear scale factor	• ³ √8		
	• calculating height	• 24 3 KU		
NOTES:				
(i) f	or 96 with or without working	award 2/3		

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
8	Ans: 9	
	• stating $\angle DEF$	• 64°
	• valid strategy	• $\frac{e}{\sin 64^\circ} = \frac{26.2}{\sin 34^\circ}$ or
		$e^{2} = 26 \cdot 2^{2} + 46 \cdot 4^{2} - 2 \times 26 \cdot 2 \times 46 \cdot 4 \cos 64^{\circ}$
	• finding third side	• 42.1
	• solution	• 9 4RE
NOTES:		·

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
9	Ans: 5:6	
	• new sugar ratio	• 4 parts
	• new fruit ratio	• 4·8 parts
	• new ratio	• 4:4.8
	• simplified ratio	• 5:6 4RE
NOTES:		

Question No	Give 1 mark for each ●	Illustrations of evidence for awarding each mark		
10	Ans: 126.9°			
	• valid strategy	• $\frac{1}{2} \times 6 \times 5 \times \sin x^{\circ} = 12$		
	• rearranging	• $\sin x^\circ = \frac{12}{15}$		
	• starting to solve	• $x = \sin^{-1}\left(\frac{12}{15}\right) = 53 \cdot 1^{\circ}$		
	• obtuse angle	• $126 \cdot 9^{\circ}$ 4RE		
NOTES:				

Question No	Give 1 mark for each ●	Illustrations of evidence fo each mark	or awarding
11 (a)	Ans: $h = \frac{kV}{b^2}$ • variation statement	• $h \propto \frac{V}{h^2}$	
	• variation equation	• $h = \frac{kV}{b^2}$	2 KU
NOTES:			
(i) i	for $h = \frac{kV}{b^2}$ without working		award 2/2
(ii)	if $h = \frac{kV}{b^2}$ is not stated in (a) but implicit in (b)		award 2/2
(iii) t	for $V = \frac{1}{3}b^2h$		award 2/2
(iv) 1	for any incorrect variation statement involving equation	<i>V</i> and <i>b</i> leading to a consistent	award 1/2
(b)	Ans: 18 cm		
	• substitution	• $12 = \frac{k \times 256}{8^2}$	
	• formula	• $h = \frac{3V}{b^2}$	
	• solution	• 18	3KU
NOTES:	·	·	
(i) 1	for use of $V = \frac{1}{3}b^2h$ followed through to the co	prrect answer	award 3/3

Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark		
12	Ans: $x = 5$			
	• valid strategy	• $(x+8)^2 = x^2 + (x+7)^2$		
	• starting to solve	• $x^2 + 16x + 64 = 2x^2 + 14x + 49$		
	• quadratic equation	$\bullet x^2 - 2x - 15 = 0$		
	• factorising	• $(x-5)(x+3)$		
	• solution	• $x = 5$		
		5RE		
NOTES:				
(i) For the third mark to be awarded the form must be $ax^2 + bc + c = 0$				

Question No	Give 1 mark for each ●	Illustrations of evidence for awarding each mark		
13 (a)	Ans: 3.875 m			
	• substitution	• $3+1\cdot75\sin(30\times5)^\circ$		
	• solution	• 3.875	2KU	
NOTES:				
(i) .	Accept $3 + 1.75 \sin 30 \times 5$			
(b)	Ans: 3.5 m			
	• beginning to solve	• 1.25 or 4.75		
	• solution	• 3.5	2RE	
NOTES:				
(i) For two wrong substitutions calculated correctly the second mark is available				
(ii)	For 3.5 without working		award 1/2	

KU 26 marks RE 26 marks

[END OF PAPER 2 MARKING INSTRUCTIONS]

FinalKU 45TotalsRE 45