CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0444 MATHEMATICS (US)

0444/31   Paper 3 (Core), maximum raw mark 104

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Abbreviations

cao   correct answer only
dep   dependent
FT   follow through after error
isw   ignore subsequent working
oe   or equivalent
SC   Special Case
nfww   not from wrong working
soi   seen or implied

Qu.	Answers	Mark	Part Marks
1 (a) (i)	48, 39 Subtract 9 oe	1, 1FT 1	**FT** 6th term = 5th term –9
(ii)	162, 486 Multiply by 3 oe	1, 1FT 1	**FT** 6th term = 5th term $\times$ 3
(b) (i)	$93 - 9n$ oe final answer	2	**B1** for $-9n$ + c or kn + 93, k $\neq$ 0
(ii)	–96 cao	2	**M1** for substitution of $n = 21$ into their **linear** expression
2 (a) (i)	Parallelolgram	1	
(ii)	0	1	
(b)	Translation	1	
	$\begin{pmatrix} 9 \\ -6 \end{pmatrix}$	1	Independent Accept 9 right, 6 down
(c) (i)	(1, 4), (4, 4), (5, 2), (2, 2)	2	**SC1** for reflection in x-axis
(ii)	(–4, –1), (–4, –4), (–2, –5), (–2, –2)	2	**SC1** for rotation 90° clockwise or correct rotation any centre
(d)	(–6, 8), (0, 8), (–8, 4), (–2, 4)	2	**SC1** for enlargement of S, scale factor 2, wrong position
(e) (i)	6	2	**M1** for 3×2
(ii)	4	1	
(iii)	24	1FT	**FT** *their* **(e)(i)** × *their* **(e)(ii)** or **FT** area of *their* **(d)** if a parallelogram and not congruent to S.

3	(a)	(i)	25	1	
		(ii)	26	1	
		(iii)	21	2	**M1** for attempt at ordering
		(iv)	20	2	**M1** for $300 \div 15$ or (sum of complete list) $\div 15$
	(b)		768	2	**M1** for 0.96×800 oe
	(c)	(i)	49.5 cao	3	**M1** for figs 66×750 soi **M1** for $\div 1000$
		(ii)	69.3[0]	1 FT	*Their* **(c)(i)** $\times 1.40$
		(iii)	110	3	**M2** for $\dfrac{their\,\textbf{(c)(ii)} - 33}{33} \times 100$ or **M1** for *their* **(c)(ii)** $- 33$ Alternative method: **M2** for $\dfrac{their\,\textbf{(c)(ii)}}{33} \times 100 - 100$ Or **M1** for $\dfrac{their\,\textbf{(c)(ii)}}{33}$
4	(a)		Hexagon correct with arcs. $AF = 7\,\text{cm}\ (\pm 2\,\text{mm})$ $EF = 8\,\text{cm}\ (\pm 2\,\text{mm})$	2	**B1** for correct hexagon without arcs or one length correct with arcs. Or **B1** for two correct arcs
	(b)		Hexagon	1	
	(c)	(i)	Bisector of *CD* with 2 pairs of arcs	2	**B1** for correct bisector with one pair or no arcs
		(ii)	Bisector of angle *ABC* with 2 pairs of correct arcs.	2	**B1** for bisector without 2 pairs of arcs
	(d)	(i)	56.55 or 56.56	2	**M1** for $(\pi \times 6^2) \div 2$ oe
		(ii)	30.85	3	**M1** for $(\pi \times 12) \div 2$ oe **M1** for '*their* $(\pi \times 12) \div 2$' $+ 12$ oe

5	(a)	(i)	−1, −4, −8, 8, 4, 1	3	1 for each symmetrical pair
		(ii)	8 points correctly plotted, within ½ square.	3FT	**B2FT** for 6 or 7 correct Or **B1FT** for 4 or 5 correct
			2 smooth correct curves, not joined	1	
		(iii)	2	1	
	(b)	(i)	−3 0 6	2	**B1** for two correct
		(ii)	Correct ruled line	1	
	(c)		1.4 to 1.6 and −3.6 to −3.4	1FT 1FT	**FT** from their graph ±0.1
	(d)		1.5	1	
6	(a)	(i)	86	1	
		(ii)	55	1	
		(iii)	81	1	
		(iv)	64	1	
	(b)		$\dfrac{y+1}{3}$ oe final answer	2	**M1** for $y+1=3x$ or $\dfrac{y}{3}=x-\dfrac{1}{3}$ Or $-y-1=-3x$
7	(a)	(i)	[Car angle =] 135 (± 2º) $135 \div 360 \times 120$ (= 45)	**B1** **M1**	
		(ii)	$\dfrac{2}{3}$ or value from 0.658 to 0.675	2	**B1** for angles of 238° to 242° or 79 to 81 people
	(b)	(i)	$x + 31 + x + 17 + 2x$ [=120] or better	3	**B1** for $x + 17$ – seen together **B1** for $2x$
		(ii)	18 cao	3	**M1 FT** for *their* $(4x + 48)$ [=120] or their $2x + x + x = 120 – 31 – 17$ or better. **M1FT** for *their* $(4x = 72)$ If zero **SC2** for a correct numerical solution of their equation of equivalent difficulty.

8	(a)	Tangent	1	
	(b)	**Tangent** and **radius** in a correct statement	1	
	(c)	8	3	**M2** for $\sqrt{17^2 - 15^2}$ or better or **M1** for $17^2 = OQ^2 + 15^2$ oe or better
	(d)	$Cos(\ldots) = \dfrac{15}{17}$ or $Sin(\ldots) = \dfrac{'8'}{17}$ or $Tan(\ldots) = \dfrac{'8'}{15}$ or better	M1	
		28.07… or 28.1	A1	
	(e)	$\dfrac{90 - 28}{2}$ oe or $(\sin^{-1}(15/17)) \div 2$	M1	
		31 or 30.95 or 30.96…	A1	
		Any 2 correct reasons from vertically opposite, angles (in a) triangle (180), isosceles	B1	
	(f)	8.24 Or 8.22 to 8.241	3	**M2** for '8' × sin ('31') × 2 or **M1** for '8' × sin ('31')
9	(a) (i)	$\dfrac{3}{3+4+8}$ or $\dfrac{180}{3+4+8}$	M1	
		$3 \div (15) \times 180$ or $\dfrac{180 \times 3}{15}$ (= 36)	M1	
	(ii)	48 [and] 96	1, 1	One mark for each. If zero, **SC1** for sum of both angles = 144.
	(b) (i)	Angle *BAC* = 35 (±2º) Angle *ABC* = 65 (±2º) and triangle completed	B1 B1	If zero **SC1** for *AC* and *BC* reversed and triangle completed
	(ii)	4.45 cm to 4.85 cm	1 FT	**FT** for their shortest side
	(c)	19.6 cao	2	**M1** for 0.5 × 7 × 5.6
		cm² oe	1	