

**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 6 <sup>th</sup> term = 5 <sup>th</sup> term - 9
	(ii) 162, 486 Multiply by 3 oe	1, 1FT 1	FT 6 <sup>th</sup> term = 5 <sup>th</sup> term × 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) Parallelogram	1	
	(ii) 0	1	
	(b) Translation $\begin{pmatrix} 9 \\ -6 \end{pmatrix}$	1 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 $3 \times 2$
	(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 $0.96 \times 800$ oe
(c) (i)	49.5 cao	3	M1 for figs $66 \times 750$ soi M1 for $\div 1000$
(ii)	69.3[0]	1 FT	Their (c)(i) $\times 1.40$
(iii)	110	3	M2 for $\frac{\text{their (c)(ii)} - 33}{33} \times 100$  or M1 for $\text{their (c)(ii)} - 33$  Alternative method: M2 for $\frac{\text{their (c)(ii)}}{33} \times 100 - 100$  Or M1 for $\frac{\text{their (c)(ii)}}{33}$
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

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5 (a) (i)	-1, -4, -8, 8, 4, 1	3	1 for each symmetrical pair
(ii)	8 points correctly plotted, within ½ square. 2 smooth correct curves, not joined	3FT 1	B2FT for 6 or 7 correct Or B1FT for 4 or 5 correct
(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)	$\frac{y+1}{3}$ oe final answer	2	M1 for $y+1=3x$ or $\frac{y}{3}=x-\frac{1}{3}$ Or $-y-1=-3x$
7 (a) (i)	[Car angle =] $135 (\pm 2^\circ)$ $135 \div 360 \times 120$ (= 45)	B1 M1	
(ii)	$\frac{2}{3}$ or value from 0.658 to 0.675	2	B1 for angles of $238^\circ$ to $242^\circ$ 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 <i>their</i> $(4x + 48)$ [=120] or <i>their</i> $2x + x + x = 120 - 31 - 17$ or better. M1FT for <i>their</i> $(4x = 72)$  If zero SC2 for a correct numerical solution of their equation of equivalent difficulty.

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