

MARK SCHEME for the May/June 2013 series

0444 MATHEMATICS (US)

0444/31

Paper 3, 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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Page 2	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2013	0444	31

Abbreviations

cao	correct answer only
cso	correct solution only
dep	dependent
ft	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
www	without wrong working
soi	seen or implied

Qu.	Answers	Mark	Part Mark	
1 (a)	(i) 1, 2, 11, 22	2	B1 for just three of these Or 3 correct with 1 extra Or all four and up to 2 extras Or 1×22 and 2×11	
	(ii) 39	1		
	(b) (i) 2, 17, 19	2		B1 for just two of these or all three and an extra one
	(ii) 1 or 27	1		
	(c) (i) 3.5×10^{-3}	1		
	(ii) 4.2×10^4	2		
2 (a)	(i) 750	1	B1 for 1(h) 36 or 2(h) 16 or 3(h) 49 or 96 or 136 or 229 or 4.24(pm) soi. M1 for $64 \div$ their time (eg. 1(h) 36(m))	
	(ii) 11, 11.5 or 12	1ft		
	(iii) 300	1		
	(iv) 1000	1		
	(b) (i) 13 02	1		
	(ii) 10 26	1		
	(c) (i) 16 24	2		
	(ii) 40 cao	2		
	(iii) 12 32	1		
3 (a)	(a) 29	1	ft is $s = 180 -$ their r M1 for either angle at A or B indicated as 90 soi	
	(b) 42	1		
	(c) [$r =$] 66 and [$s =$] 114	1, 1ft		
	(d) 50	1		
	(e) 56	2		

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2013	0444	31

4	(a) (i)	one correct line	1	B1 for either correct line with at most one incorrect B1 for reflection in $x = k$ or $y = 4$ B1 for 5 left or 4 down SC for translation of $\begin{pmatrix} -4 \\ -5 \end{pmatrix}$ B1 for a correct rotation about the wrong centre
	(ii)	only two correct lines	2	
	(b)	correct square	1	
	(c) (i)	correct reflection	2	
	(ii)	correct translation	2	
	(iii)	correct rotation	2	
	(d) (i)	rotation centre (0, 0) angle 90° [anti clockwise]	1 1 1	
	(ii)	translation $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$	1 1	
5	(a) (i)	140	1	If 0 scored SC1 for their total = 240 B1 ft for correct sectors drawn B1 for correct labelling consistent with table M1 for (attempt to add) $\div 12$ isw
	(ii)	100	1	
	(b) (i)	40	1	
	(ii)	29.5	2	
	(iii)	$\frac{7}{12}$ oe	1	
6	(a)	4 points plotted correctly	2	B1 for 3 points plotted correctly 1ft ft from their (c) if ruled and negative gradient
	(b)	negative	1	
	(c)	correct ruled line	1	
	(d)	22.4 – 22.8	1ft	

Page 4	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2013	0444	31

7 (a) (i)	$x + 12$ $x - 34$ $x - 22$	1, 1, 1	in each part allow correct unsimplified terms
(ii)	$x + 12 = 3(x - 22)$ 39 cao	1ft 3	accept $x + 12 = 3x - 66$ or $\frac{(x+12)}{3} = x - 22$ M1 for their $3x - 66$ seen M1 for correctly collecting terms from $ax + b = cx + d$ $a, b, c, d \neq 0$
(b)	$\frac{8}{-3}$	3	M1 for correct method to eliminate one variable A1 for x or y correct.
8 (a)	86.3	2	M1 for $[BC =] \sqrt{27^2 + 82^2}$ or $\sqrt{729 + 6724}$ or $\sqrt{7453}$
(b)	090 cao	1	
(c) (i)	71.8	2	M1 for $[x =] (82 \div 27)$ or better oe
(ii)	108.2 or 108	1ft	
(d) (i)	1107	2	M1 for $27 \times 82 \div 2$ or better, imp by 1110
(ii)	9 298 800	1ft	
9 (a)	31 200	2	M1 for $(43\ 680 \div 7) \times 5$ or 6240×5
(b)	16 800	3	M2 for $15\ 000 + 15\ 000 \times 0.04 \times 3$ oe or M1 for $15\ 000 \times 0.04 \times 3$ oe, imp by 1800
(c)	63	2	M1 for $450 \times [0].14$ oe
(d) (i)	11 800	2	M1 for $600 + 0.35 \times 32\ 000$ or better
(ii)	12 900	2	M1 for $100 + 4 \times 32\ 000 \div 10$ or better
10 (a) (i)	2 and 2 12	1 1	all in correct places
(ii)	7 points correctly plotted correct curve through 7 points	3ft 1	P2ft for 5 or 6 points correctly plotted P1ft for 3 or 4 points correctly plotted
(iii)	correct line	1	must be ruled and continuous
(iv)	2.6 – 2.8	1ft	ft their curve and their line
(b) (i)	$\frac{2}{3}$	1	
(ii)	$y = \frac{2}{3}x + c$	1	c not -5

Page 5	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2013	0444	31

(c)	$[y =] 2x - 3$	3	M2 for $y = 2x + p$ Or M1 for attempt at gradient i.e $\frac{\text{rise}}{\text{run}}$ B1 for $y = qx - 3 \quad q \neq 0$
11 (a)	113 or 113.09 to 113.112	2	M1 for $\pi \times 6^2$ or better
(b)	185 or 186 or 185.76 or 185.328 to 185.42	4	M1 for their (a) $\times 6$ soi M1 for 24×36 soi, imp by 864 M1 for their $(24 \times 36) - \text{their (their (a)} \times 6)$ ft their (a) for M3