

**MARK SCHEME for the May/June 2013 series**

**0580 MATHEMATICS**

**0580/31**

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
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 Answers
<b>1</b>	<b>(a) (i)</b> 750	1	
	<b>(ii)</b> 11, 11.5 or 12	1ft	
	<b>(iii)</b> 300	1	
	<b>(iv)</b> 1000	1	
	<b>(b) (i)</b> 13 02	1	
	<b>(ii)</b> 10 26	1	
	<b>(c) (i)</b> 16 24	2	<b>B1</b> for 1 (h) 36 or 2 (h) 16 or 3 (h) 49 or 96 or 136 or 229 or 4.24(pm) soi.
	<b>(ii)</b> 40 cao	2	<b>M1</b> for $64 \div$ their time (e.g. 1(h) 36(m) )
	<b>(iii)</b> 12 32	1	
<b>2</b>	<b>(a)</b> 29	1	
	<b>(b)</b> 42	1	
	<b>(c)</b> [ $r =$ ] 66 and [ $s =$ ] 114	1,1ft	Ft is $s = 180 -$ their $r$
	<b>(d)</b> 50	1	
	<b>(e)</b> 56	2	<b>M1</b> for either angle at $A$ or $B$ indicated as 90 soi

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3	(a) (i)	one correct line	1	<b>B1</b> for either correct line with at most one incorrect  <b>B1</b> for reflection in $x = k$ or $y = 4$  <b>B1</b> for 5 left or 4 down <b>SC</b> for translation of $\begin{pmatrix} -4 \\ -5 \end{pmatrix}$  <b>B1</b> 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 $90^\circ$ [anticlockwise]	1 1 1			
	(ii)	translation $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$	1 1			
	4	(a) (i)	140 100		1 1	if 0 scored <b>SC1</b> for their total = 240  <b>B1 ft</b> for correct sectors drawn <b>B1</b> for correct labelling consistent with table  <b>M1</b> for (attempt to add) $\div 12$  isw
		(ii)	correct labelled pie chart		2ft	
(b) (i)		40	1			
(ii)		29.5	2			
(iii)		$\frac{7}{12}$ oe	1			
5		(a)	4 points plotted correctly	2	<b>B1</b> for 3 points plotted correctly    Ft from their (c) if ruled and negative gradient	
	(b)	negative	1			
	(c)	correct ruled line	1			
	(d)	22.4 – 22.8	1ft			

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6	(a) (i)	1, 2, 11, 22	2	<b>B1</b> for just three of these or 3 correct with 1 extra or all four and up to 2 extras or $1 \times 22$ and $2 \times 11$  <b>B1</b> for just two of these or all three and an extra one  <b>M1</b> for 42 000 oe
	(ii)	39	1	
	(b) (i)	2,17,19	2	
	(ii)	1 or 27	1	
	(c) (i)	$3.5 \times 10^{-3}$	1	
	(ii)	$4.2 \times 10^4$	2	
7	(a)	86.3 or 86.33075.....	2	<b>M1</b> for $[BC =] \sqrt{27^2 + 82^2}$ or $\sqrt{729+6724}$ or $\sqrt{7453}$  <b>M1</b> for $\tan [x=] (82 \div 27)$ or better oe  <b>M1</b> for $27 \times 82 \div 2$ or better, imp by 1110
	(b)	090 cao	1	
	(c) (i)	71.8 or 71.77492.....	2	
	(ii)	108.2 or 108	1ft	
	(d) (i)	1107	2	
	(ii)	9 298 800	1ft	
8	(a)	31 200	2	<b>M1</b> for $(43\ 680 \div 7) \times 5$ or $6240 \times 5$  <b>M2</b> for $15\ 000 + 15\ 000 \times 0.04 \times 3$ oe or <b>M1</b> for $15\ 000 \times 0.04 \times 3$ oe, imp by 1800  <b>M1</b> for $450 \times [0].14$ oe  <b>M1</b> for $600 + 0.35 \times 32\ 000$ or better  <b>M1</b> for $100 + 4 \times 32\ 000 \div 10$ or better
	(b)	16 800	3	
	(c)	63	2	
	(d) (i)	11 800	2	
	(ii)	12 900	2	

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9	(a) (i)	2 and 2 12	1 1	all in the correct places
	(ii)	7 points correctly plotted correct curve through the 7points	3ft 1	<b>P2ft</b> for 5 or 6 points correctly plotted <b>P1ft</b> 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 $-5$
	(c)	$[y =] 2x - 3$	3	<b>M2</b> for $y = 2x + p$ or <b>M1</b> for attempt at gradient i.e. $\frac{\text{rise}}{\text{run}}$  <b>B1</b> for $y = qx - 3 \quad q \neq 0$
10	(a) (i)	$x + 12$ $x - 34 \quad x - 22$	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 $(x + 12) / 3 = x - 22$  <b>M1</b> for their $3x - 66$ seen <b>M1</b> for correctly collecting terms from $ax + b = cx + d \quad a, b, c, d \neq 0$
	(e)	8 -3	3	<b>M1</b> for correct method to eliminate one variable. <b>A1</b> for $x$ or $y$ correct.
11	(a)	113 or 113.09 to 113.112	2	<b>M1</b> for $\pi \times 6^2$ or better
	(b)	185 or 186 or 185.76 or 185.328 to 185.42	4	<b>M1</b> for their (a) $\times 6$ <b>M1</b> for $24 \times 36$ soi, imp by 864 <b>M1</b> for their $(24 \times 36) - \text{their (their (a) } \times 6)$ ft their (a) for <b>M3</b>