

**MARK SCHEME for the May/June 2011 question paper
for the guidance of teachers**

0580 MATHEMATICS

0580/33

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.

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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

Qu.	Answers	Mark	Part Marks	
1	(a) 805	2	M1 for $110 \times 5 + 85 \times 3$	
	(b) 50	2	M1 for $750 - 120 \times 5$	
	(c)	(i) 90	2	M1 for $150 \div (3 + 2) \times 3$
		(ii) 5 : 2	3	M1 for 3×5 and 2×3 or $90\text{ft} \times 5$ and $(150 - 90\text{ft}) \times 3$ A1 for 450 : 180 oe or 2.5:1 or 1:0.4
	(d) 6.5(0)	2	M1 for 5×1.3 oe	
	(e) 10 www	3	M2 for $\frac{0.30}{3} \times 100$ oe (M1 for 0.30 or 30c) If M0 then SC1 for $\frac{0.3}{2.7} \times 100$ (implied by 11.1...%)	
2	(a) Accurate triangle <i>PQR</i> with arcs	2	SC1 for accurate without arcs or correct mirror image with arcs	
	(b)	(i) Accurate perpendicular bisector of <i>PR</i> with arcs	2ft	SC1 ft for accurate without arcs or accurate arcs without line or accurate with arcs of other side.
		(ii) Accurate angle bisector of angle <i>P</i> with arcs	2ft	SC1 ft for accurate without arcs or accurate arcs without line or accurate with arcs of other angle.
	(c) Region shaded cao	1	Intended region clear	
	(d) 4.5 cao	2	SC1 for figs 45 or 3.5 or 1 cm = 0.5 km	
3	(a) 50	1		
	(b) 72	2	M1 for $288 \times 90 \div 360$ oe	
	(c) 1	1		
	(d)	(i) 40, 96, 72 ft, 80	2ft	B1 for 2 or 3 correct or SC1 for total of 288
		(ii) 1.67	3ft	ft their table M1 for $(40 \times 0) + 96 \times 1 + 72 \times 2 + 80 \times 3$ M1 (dep) for \div total by 288

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(e) (i)	$\frac{100}{360}$ oe (0.2777... or 27.77...%)	1ft	ft their table if used i.e. $\frac{their80}{their288}$
(ii)	$\frac{310}{360}$ oe (0.8611... or 86.11...%)	2ft	M1 for 120 + 90 + 100 or 96 + 72 + 80 ft their table if used i.e. $\frac{their248}{their288}$
(iii)	0	1	allow 0/360 or 0/288, zero, none, impossible
(f)	400	1ft	ft their table or their (e)(i) if either used must be an integer answer
4 (a)	1.12	2	M1 for 1.4×0.8
(b)	224	1ft	ft (a) $\times 200$
(c) (i)	39.3 (39.25 to 39.28)	2	M1 for $\pi \times 0.25^2 \times 200$
(ii)	185 (184.7 to 184.8)	1ft	ft their (b) – their (c)(i)
(iii)	4.9 cao www 3	3ft	M1 for (c)(i) $\div 8000$ A1 for 0.00491 (0.004906 to 0.004910) ft their (c)(i)
5 (a) (i)	-1.5, 2, 1.5	2	B1 for 2 correct
(ii)	12 correct points Correct curve in two branches through at least 10 points	P3ft C1	ft their table P2 for 10 or 11 points ft P1 for 8 or 9 points must be two branches of a rectangular hyperbola between the axes
(b) (i)	0, -1.5, -1.5, 0	2	B1 for 2 or 3 correct
(ii)	9 correct points Correct curve through at least 7 points	P3ft C1	ft their table P2 for 7 or 8 points ft P1 for 5 or 6 points must be close to parabola in shape
(c)	(2.7 to 2.99, 2.01 to 2.3) cao	1, 1	
6 (a)	70	2	M1 for 180–140 or 40 at A oe
(b)	108	2	M1 for 72 vertically opposite to given 72 or next to q or 108 next to 72 given
(c)	54	1	
(d)	68	1	
(e) (i)	Similar	1	Allow enlarged
(ii)	12.5	2	M1 for $\frac{XZ}{10} = \frac{10}{8}$ oe or better

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7	(a) (i)	4	2	M1 for $2x + x = 15 - 3$ or better
	(ii)	11	2	M1 for $2y - 1 = 7 \times 3$ or $\frac{2y}{3} = 7 + \frac{1}{3}$ or better
	(iii)	1.5 oe	3	M1 for $2(u - 1) = 1$ A1 for $2u - 2 = 1$
	(b) (i)	$p = 2q + r$ or $p = r + 2q$ oe	1	
	(ii)	$k = (l + m)^2$	2	SC1 for $(l + m)^2$ or for $k = \sqrt{l + m}$
	(c)	2.9 cao www 4	4	M1 for $2w$ or $3(w - 1)$ M1 for $2w + 3(w - 1) = 11.5$ A1 for $2w + 3w = 11.5 + 3$ or better
8	(a) (i)	Image at (3, -1), (5, -1), (5, -2), (3, -3)	1	
	(ii)	Image at (6, 5), (8, 5), (8, 6), (6, 7)	2	SC1 for translation by $\begin{pmatrix} 3 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 4 \end{pmatrix}$ or $\begin{pmatrix} -3 \\ -4 \end{pmatrix}$
	(iii)	Image at (-3, -1), (-5, -1), (-5, -2), (-3, -3)	2	SC1 for 180° rotation not about (0, 0)
	(b) (i)	Reflection, $x = -1$	1, 1	Allow clearly labelled line in place of $x = -1$
	(ii)	Enlargement, (factor) 3, (centre) (6, 1)	1, 1, 1	Allow centre clearly labelled
9	(a)	Diagram drawn	1	
	(b)	7, 9, 11	2	B1 for 2 correct
		21 $2n + 1$ oe	1 2	SC1 for $2n +$ or $-$ any integer
	(c)	368	2ft	Must be integer for 2 marks M1 for their $2n + 1 = 737$ ft if linear
(d)	20, 44, $4(n + 1)$ oe	1, 1 1		