

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

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.

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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 Mark
1	(a) 342.63	2	M1 for $500 \div 1.4593$
	(b) 280	3	M1 for $2 \times 62 + 3 \times 52$ B1 for 124 or 156 seen
	(c) 71.4 or 71.42 to 71.43	1ft	
	(d) 4.12	2	B1 for 6×0.98 seen B1 for 5.88 or $4 + 6 \times 0.02$
	(e) correct working	1	$50 \times 2.54 = 127$ oe or $130 \div 2.54 = 51.2$ or better
2	(a) (triangular) prism	1	
	(b) 49.6 to 50.4	1	
	(c) (i) 6	2	M1 for $\frac{1}{2} \times 4 \times 3$ oe
	(ii) 42	2ft	M1 for their (c)(i) $\times 7$
	(d) 3.5	2ft	M1 for their (c)(ii) $\div (3 \times 4)$ oe
3	(a) (i) 10	2	M1 $3 \times 2 - -4$ or better
	(ii) 8	3	M1 for $19 = 3m - 5$ oe M1 for $m = (19 + 5) \div 3$ oe
	(b) $7fg - g^3$	2	B1 for $7fg$ or B1 for $-g^3$
	(c) $6h(3h - 2j)$	2	B1 for partial factorisation $2(9h^2 - 6hj)$ or $3(6h^2 - 4hj)$ or $h(18h - 12j)$ or $6(3h^2 - 2hj)$ or $3h(6h - 4j)$ or $2h(9h - 6j)$ or B1 for $6h(ah - 2j)$ or $6h(3h - bj)$
	(d) $\frac{t-15}{8}$	2	M1 for correct first step or M1 for correct second step ft
	(e) 9	3	M1 for $3p - 15$ M1 for collecting their terms $2p = k$ or $kp = 18$

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4	(a) (i)	1	1	
	(ii)	15	1	
	(iii)	10	1	
	(b) (i)	3	1	
	(ii)	24	2	M1 for $4 \div 10 \times 60$ or M1 for $4 \div \frac{1}{6}, 4 \times 6,$ $(4 \times 60)/10$ oe
	(iii)	6.67 or 6.66(6...)	3	M1 for dist = 5 and time = 45 seen M1 for $5 \div 45 \times 60$ oe
	(c)	horizontal line to (105, 5) line from (their 105, 5) to (10 + their 105, 0)	1 1ft	
5	(a) (i)	2	2	M1 for numbers representing change in y / change in x Implied by $2k/k$
	(ii)	$2x + 1$	2ft	M1 for {their (a)(i) } $x + j$ or $kx + 1$ (j, k not equal to 0)
	(b) (i)	2 -2 2	2	B1 for 2 correct
	(ii)	7 points correct smooth curve	3 ft 1	B2 for 5 or 6 points correct B1 for 3 or 4 points correct Must be close to parabolic in shape
	(iii)	-1.5 to -1.3 cao 1.3 to 1.5 cao	1 1	
	(c)	(-1, -1) and (3, 7) cao	1, 1	

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6	(a) (i)	144	1	
	(ii)	125	1	
	(iii)	103	1	
	(iv)	159	1	
	(b)	$2^3 \times 11$ or $2 \times 2 \times 2 \times 11$	2	SC1 for 2 and 11 seen, no extras or SC1 for $2 \times 4 \times 11$
	(c)	24	2	SC1 for at least one of 2, 3, 4, 6, 8 or 12 or SC1 for $72 = 3 \times 24$ and $96 = 4 \times 24$
(d)	60	2	SC1 for $60k$ or SC1 $2 \times 2 \times 3 \times 5$ oe	
7	(a) (i)	correct reflection	1	
	(ii)	correct rotation	2	SC1 for rotation 90° anti-clockwise or 90° clockwise about any other point
	(b) (i)	enlargement sf 2 about origin	1 1 1	independent marks
	(ii)	translation by $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$	1 1	independent marks
8	(a)	frequencies 5, 3, 3, 0, 2	3	B2 for 4 correct, B1 for 3 correct If frequencies blank then SC2 for all tallies correct, SC1 for 3
	(b) (i)	9	1	
	(ii)	3	1ft	
	(iii)	5	2	M1 clear attempt to find middle
	(iv)	4.8	3	M1 for Σ their $f \times x$ implied by 144 – clear attempt M1 dep for dividing by 30 isw
	(c) (i)	$\frac{3}{30}$ oe	1	
	(ii)	0	1	allow 0/30 only, accept zero, none, impossible
(iii)	$\frac{17}{30}$ oe	1	accept 0.566 to 0.567 isw	

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9	(a)	correct triangle with arcs	2	B1 without arcs or SC1 correct mirror image with arcs	
	(b)	68° to 71°	1ft		
	(c)	(i)	perpendicular bisector with 2 pairs of arcs	2	SC1 if accurate without arcs or accurate arcs with no line or accurate with arcs of <i>AB</i> or <i>AC</i>
		(ii)	3 to 3.4 cm	1ft	for their <i>P</i> on their bisector
	(d)	arc centre their <i>A</i> radius 5 cm	1ft	minimum must cut their <i>AB</i> and <i>AC</i>	
(e)	shading inside arc and to left of perpendicular bisector	2	SC1 for either condition met		
10	(a)	(i)	95.8 or 95.83 to 95.84	2	M1 for $120 \times \sin 53$ or $\sin 53 = \frac{x}{120}$ oe
		(ii)	233°	1cao	
	(b)	(i)	20.6° or 20.55 to 20.56	2	M1 for $\tan = \frac{9}{24}$ oe
		(ii)	17.9	3	M2 for $\sqrt{20^2 - 9^2}$ or M1 for $x^2 + 9^2 = 20^2$ oe