

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

0580 MATHEMATICS

0580/41

Paper 4 (Extended), maximum raw mark 130

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Page 2	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2011	0580

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
- art anything rounding to
- soi seen or implied

Qu.	Answers	Mark	Part Marks
1 (a)	(i) $\frac{1380}{62 + 53} \times 62$	1	Allow 115 for 62 + 53
	(ii) 7.27 (7.271 to 7.272)	1	
	(iii) 42	2	M1 for $\frac{3150}{75}$ oe
(b)	(i) 235	3	B2 for angle $ACS = 55$ or angle $ACN = 125$ B1 for 55 seen
	(ii) 12.6 (12.58 to 12.59)	3	M2 for $\frac{4}{6} \times 18.9$ or $4 + 4 + 2 \times 4 \times \cos 55$ or $4 + 4 + 2 \times 4 \times \sin 35$ oe (M1 for $\frac{4}{6}$ soi or $2 \times 4 \times \cos 55$ or $2 \times 4 \times \sin 35$ soi oe)
(c)	1500	3	M2 for $\frac{1380}{1 - 0.08}$ oe (M1 for recognition that 92% = 1380)

Page 3	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2011	0580

<p>2 (a)</p> <p>Monday $\frac{3}{5}, \frac{2}{5}$</p> <p>Tuesday $\frac{4}{7}, \frac{3}{7}$</p> <p>$\frac{5}{7}, \frac{2}{7}$</p> <p>(b)</p> <p>(i) $\frac{12}{35}$ oe cao</p> <p>(ii) $\frac{9}{35}$ oe cao</p> <p>(iii) $\frac{19}{35}$ oe</p> <p>(c) $\frac{34}{35}$ oe cao</p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>2 ft</p> <p>3</p>	<p>M1 $\frac{3}{5} \times \frac{4}{7}$ ft their tree</p> <p>M1 $\frac{3}{5} \times \frac{3}{7}$ ft their tree</p> <p>ft their (b)(ii) + $\frac{10}{35}$ ft their tree throughout (iii)</p> <p>M1 for $\frac{2}{5} \times \frac{5}{7}$ + their (b)(ii)</p> <p>or $1 - \frac{3}{5} \times \frac{4}{7} - \frac{2}{5} \times \frac{2}{7}$</p> <p>ft their tree throughout (iv)</p> <p>M2 for $1 - \frac{2}{5} \times \frac{2}{7} \times \frac{1}{4} \left(= 1 - \frac{1}{35} \right)$</p> <p>(M1 for $\frac{2}{5} \times \frac{2}{7} \times \frac{1}{4} \left(= \frac{1}{35} \right)$)</p> <p>or M2 for $\frac{3}{5} + \frac{2}{5} \times \frac{5}{7} + \frac{2}{5} \times \frac{2}{7} \times \frac{3}{4}$</p> <p>(M1 for any two of these)</p>
<p>3 (a) 3 www</p> <p>(b)</p> <p>(i) $(x + 5)(x - 5)$</p> <p>(ii) $\frac{(2x + 1)}{(x - 5)}$ final answer</p> <p>(c) $x < 7$ oe final answer</p>	<p>3</p> <p>1</p> <p>3</p> <p>3</p>	<p>M1 for $p = \frac{k}{(m+1)}$ oe A1 for $k = 36$</p> <p>or M2 for $4 \times 9 = p \times 12$ oe</p> <p>B2 for factors $(2x + 1)(x + 5)$ or SC2 for final answer $\frac{x + \frac{1}{2}}{x - 5}$</p> <p>(B1 for $(2x + a)(x + b)$ where $ab = 5$ or $2b + a = 11$ or SC1 for $(x + \frac{1}{2})(x + 5)$)</p> <p>M2 for $8x * 56$ where * is inequality or = sign</p> <p>(B1 for $5x - 20$ or $36 - 3x$)</p>

Page 4	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2011	0580

4 (a)	<p>(i) $\cos(HFG) = \frac{6^2 + 14^2 - 12^2}{2 \times 6 \times 14}$ 58.4 (58.41...)</p> <p>(ii) $0.5 \times 6 \times 14 \times \sin(\text{their } 58.4)$ oe 35.8 or 35.77 to 35.78</p> <p>(b) $\sin(RQP) = \frac{\sin(117) \times 12}{18}$ 36.4 or 36.44...</p>	<p>M2 A2 M1 A1ft M2 A1</p>	<p>M1 for implicit form A1 for 0.5238... ft their (i) Correct or ft their (i) M1 for implicit form</p>
5 (a)	<p>(i) Correct translation (see diagram)</p> <p>(ii) Correct reflection (see diagram)</p> <p>(b) (i) Stretch, (factor) 3, y-axis or $x = 0$ invariant</p> <p>(ii) Rotation 90° clockwise (1, -1)</p> <p>(c) (i) $\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}$ ft from (b)(i)</p> <p>(ii) Rotation, 180° Origin</p>	<p>2 2 1 1 1 1 1 1 2 ft 1 1 1</p>	<p>SC1 for translation by $\begin{pmatrix} -3 \\ k \end{pmatrix}$ or by $\begin{pmatrix} k \\ -2 \end{pmatrix}$ SC1 for reflection in $y = -1$ Accept -90° SC1 for $\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$ (ft from (b)(i)) or $\begin{pmatrix} k & 0 \\ 0 & 1 \end{pmatrix}$ with k algebraic or numeric but $\neq 1$ or 0 Accept O or (0,0)</p>
6 (a)	<p>23.6 (23.60...)</p> <p>(b) 2300 or 2303 to 2304 cao</p> <p>(c) 4788 or 4790 cao</p> <p>(d) 43(.0) or 43.04 to 43.05 cao</p> <p>(e) 18.9° to 19.02° cao</p>	<p>2 4 2 2 3</p>	<p>M1 for $14^2 + 19^2$ M3 for $2 \times \frac{1}{2} \times 14 \times 19 + 14 \times 36 + 19 \times 36 +$ their $BC \times 36$ M2 for 4 of these added M1 for $\frac{1}{2} \times 14 \times 19$ M1 their triangle area $\times 36$ M1 for (their (a))² + 36² or 36² + 19² + 14² M2 for $\text{inv sin} \left(\frac{14}{\text{their } CE} \right)$ or $\text{inv tan} \left(\frac{14}{\sqrt{19^2 + 36^2}} \right)$ or $\text{inv cos} \left(\frac{\sqrt{19^2 + 36^2}}{\text{their } CE} \right)$ or complete longer methods (M1 for clearly identifying angle CEA)</p>

Page 5	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2011	0580

7 (a)	1(.00) 4(.00) 11.1(1) 1(.00) 0.25	3	B2 for 4 correct, B1 for 3 correct
(b)	10 points plotted Correct shaped curve through 10 points (condone 2 points slightly missed) 2 separate curves not crossing x-axis and not touching or crossing y-axis	P3 ft C1 ft B1	B2 for 8 or 9 points correct ft B1 for 6 or 7 points correct ft ft their points if shape correct – ignore anything between – 0.6 and 0.6 Independent
(c)	–0.85 to – 0.75 cao 0.75 to 0.85 cao	1 1	
(d)	Tangent drawn (ruled) at $x = 1.5$ – 3 to – 2	T1 2	Allow slight daylight Dep on T1 M1 evidence rise/run dependent on tangent SC1 for answer in range 2 to 3 Answer implies M but not the T mark
(e) (i)	$y = x - 2$ oe	1	
(ii)	line ruled to cross curve	2 ft	Dependent on (i) in form $y = mx + c$, $m \neq 0$, $c \neq 0$ B1 for gradient ft or y intercept ft but again to cross curve at all possible points
(iii)	2.5 to 2.7 cao	1	Dependent on (e)(i) correct
8	14.2 14 13	3 2 1	M1 for Σfx ($10 \times 11 + 8 \times 12 + 16 \times 13 + 11 \times 14 + 7 \times 15 + 8 \times 16 + 6 \times 17 + 9 \times 18$) (1065) (allow one error or omission) M1dep for $\div \Sigma f$ ($10 + 8 + 16 + 11 + 7 + 8 + 6 + 9$) (75) (allow one further error or omission)
(b) (i)	21, 30, 15	2	M1 for 37th, 37.5th or 38th seen
(ii)	20 20 10 (10) 1.05 1.5 1.5 (0.9)	1 2 3	B1 for 2 correct 1, 1, 1 for each correct vertical pair
(c)	$\frac{10 \times 2.5 + 12 \times 3 + 4n}{10 + 12 + n} (= 3.1)$ multiplying across and collecting terms ($n =$) 8	M2 M1 A1	M1 for either numerator or denominator seen dep on linear numerator and denominator their $(68.2 - 25 - 36) =$ their $(4 - 3.1) \times n$
	www 4		

Page 6	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2011	0580

9 (a)	$x \geq 3$ $y \geq 2$	1, 1	
(b)	$x + y \leq 9$	1	
(c)	$6x + 14y \leq 84$	1	
(d)	$x = 3$ $y = 2$ $x + y = 9$ Line from (0, 6) to (14, 0) Correct quadrilateral unshaded or clearly indicated	1, 1 2 2 1	Accept clear and freehand lines long enough to define the correct quadrilateral SC1 for line through (0, 9) or (9, 0) B1 for through (0, 6) or (14, 0)
(e)	\$ 70	2	B1 for considering (7, 2)
10(a)	(A 1) 8 27 64 125 (B 4) 8 12 16 20 (C 4) 9 16 25 36	2 1 2	B1 for 3 correct B1 for 3 correct
(b)	512 169	1 1	
(c)	25 99	1 1	
(d)	145 $n^3 + 4n$ oe 16 $(n + 1)^2 - 4n$ oe but isw	1, 1 1, 1	Likely oe is $(n - 1)^2$