

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

**0580 MATHEMATICS**

**0580/23**

Paper 2 (Extended), maximum raw mark 70

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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<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>IGCSE – May/June 2013</b>	<b>0580</b>	<b>23</b>

### 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 Marks
<b>1</b>	£ or pound[s] <b>Correct working must be shown</b>	<b>2</b>	<b>M1</b> for $425 \div 1.14$ or $365 \times 1.14$
<b>2</b>	$\frac{30}{300}$ oe www	<b>2</b>	<b>M1</b> for 30 seen or $\frac{k}{300}$ seen
<b>3</b>	1500 or 3 pm	<b>2</b>	<b>B1</b> for 1h50 or 2h[0]5 or <b>SC1</b> for 1255 + <i>their</i> 1h50 + 15mins correctly evaluated
<b>4 (a)</b>	[ ± ] <b>2.28</b> or 2.282 to 2.2822	<b>1</b>	
<b>(b)</b>	<b>0.109</b> or 0.1094[3...]	<b>1</b>	
<b>5</b>	$\left(\frac{2}{3}\right)^{1.5}$ $\left(-\frac{2}{3}\right)^{\frac{2}{3}}$ $(1.5)^{\frac{2}{3}}$ $\left(\frac{2}{3}\right)^{-1.5}$	<b>2</b>	<b>M1</b> for at least 2 correct decimals seen 1.3[1..] 0.5[4..] 1.8[3..] or 1.84 0.7[6..]
<b>6</b>	6	<b>3</b>	<b>M2</b> for $3 \times \sqrt[3]{\frac{288\pi}{36\pi}}$ or <b>M1</b> for $3 \times \sqrt[3]{\frac{288\pi}{36\pi}}$ or $3 \times \sqrt[3]{\frac{36\pi}{288\pi}}$
<b>7</b>	260	<b>3</b>	<b>M2</b> for $[2 \times ](4 \times 10 + 18 \times 5)$ oe or <b>M1</b> for a correct area statement
<b>8</b>	2500	<b>3</b>	<b>M1</b> for $m = kr^3$ <b>A1</b> for $k = 20$
<b>9 (a)</b>	$1.1 \times 10^5$	<b>2</b>	<b>B1</b> for 110 000 oe e.g. $11 \times 10^4$
<b>(b)</b>	$5 \times 10^3$	<b>2</b>	<b>B1</b> for 5000 oe e.g. $0.5 \times 10^4$

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2013	0580	23

10	25	4	<p><b>M1</b> for correct method to eliminate one variable</p> <p><b>A1</b> for <math>x = 11</math></p> <p><b>A1</b> for <math>y = 3</math></p> <p><b>B1 FT</b> for <math>2 \times \text{their } x + \text{their } y</math> correctly evaluated</p>
11 (a)	77	2	<p><b>M1</b> for 11,13,17,19 clearly identified, ignore numbers less than 8 with no other numbers greater than or equal to 8 besides possibly an extra 17</p>
(b)	either 18 or 19 or both	2FT	<p><b>M1</b> for 11,13,17 clearly identified, ignore numbers less than 8 with no other numbers greater than or equal to 8 besides possibly an extra 17</p> <p>or for <i>their</i> (a) – 58</p>
12 (a)	$\frac{5}{25}$ oe	2	<p><b>B1</b> for answer <math>\frac{5}{k}</math> or <math>\frac{k}{25}</math></p>
(b)	$\frac{4}{25}$ oe	2	<p><b>B1</b> for answer <math>\frac{4}{k}</math> or <math>\frac{k}{25}</math></p>
13	$\frac{8x}{(x-3)(x+1)}$	4	<p><b>B1</b> for common denominator <math>(x-3)(x+1)</math> seen</p> <p><b>B1</b> for <math>(x+3)(x+1) - (x-1)(x-3)</math> soi</p> <p><b>B1</b> for <math>x^2 + 3x + x + 3</math> or <math>x^2 - 3x - x + 3</math> soi</p>
14 (a)	$n < 9$	2	<p><b>M1</b> for <math>2n &lt; 18</math> or <math>2n - 18 &lt; 0</math> oe</p> <p>If 0 scored <b>SC1</b> for 9 with incorrect inequality.</p>
(b)	$(b+d)(a+c)$	2	<p><b>B1</b> for <math>b(a+c) + d(a+c)</math></p> <p>or <math>a(b+d) + c(b+d)</math></p>
15 (a)	4	2	<p><b>M1</b> for attempt at sum of all numeric and <math>x</math> terms equated to 74</p>
(b)	26	1FT	<p>=18 + 2 <math>\times</math> their (a)</p>
(c)	8	1	
16 (a)	1.5	2	<p><b>B1</b> for <math>[g(18) = ] 4</math></p>
(b)	$2(x+5)$ or $2x+10$	2	<p><b>M1</b> for correct first step e.g. <math>x = \frac{y}{5} - 5</math> or</p> <p><math>\frac{x}{2} = y + 5</math> or <math>2y = x - 10</math></p>

Page 4	Mark Scheme	Syllabus	Paper
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17 (a)	$\begin{pmatrix} 7 & 23 & 16 \\ 12 & 45 & 27 \end{pmatrix}$	2	<b>B1</b> for any one row or column correct, must be in a 2 by 3 matrix
(b)	$\frac{1}{3} \begin{pmatrix} 6 & -3 \\ -3 & 2 \end{pmatrix}$	2	<b>B1</b> for $k \begin{pmatrix} 6 & -3 \\ -3 & 2 \end{pmatrix}$ or $\frac{1}{3} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$
18	15.4 or 15.35 to 15.36	4	<b>M1</b> for $\frac{120}{360} \times \pi \times 5^2$ oe <b>M1</b> for $\frac{1}{2} \times 5^2 \times \sin 120$ oe <b>M1</b> for $\frac{120}{360} \times \pi \times 5^2 - \frac{1}{2} \times 5^2 \times \sin 120$ oe
19 (a)	hexagon	1	
(b) (i)	$-\mathbf{b} + \mathbf{c}$	1	
(ii)	$\mathbf{b} - \frac{1}{2}\mathbf{c}$	2	<b>B1</b> for <b>OB + BA</b> or any correct route
(iii)	$-\mathbf{b} + \mathbf{c}$	1FT	= <i>their</i> (b)(i)
20 (a)	$[\pm] 3.1623$ cao	2	<b>M1</b> for $\sqrt{10}$ seen
(b)	$\frac{4}{y^2 - 8}$ oe final answer	4	<b>M1</b> first move completed correctly <b>M1</b> second move completed correctly <b>M1</b> third move completed correctly <b>M1</b> final move completed correctly on answer line