

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

**MARK SCHEME for the May/June 2012 question paper**  
**for the guidance of teachers**

**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.

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<b>Page 2</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>IGCSE – May/June 2012</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
1	95	2	<b>B1</b> for 85 seen or <b>M1</b> $x = 180 -$ their angle $ADC$ , if it is clearly seen
2	120	2	<b>M1</b> for $\frac{750 \times 2 \times 8}{100}$ oe seen or <b>SC1</b> 870 as final answer
3	(a) 3.26077... (b) 3.261	1 <b>1ft</b>	seen their (a) to 4 significant figures
4	$y \neq -1.25$	2	<b>M1</b> inequality with $y$ 's and constants correctly collected
5	33 <b>cao www</b>	2	<b>M1</b> any two of 5.5, 9.5, 12.5 seen
6	31.7	2	<b>M1</b> $0.5 \times 9 \times 15 \times \sin 28$
7	$u = 24(.0), v = 0.6$	2	<b>B1</b> each
8	7 <b>cao</b>	3	<b>B1</b> for 39.5(0) or 31.5(0) or 42 <b>M1</b> for (their 39.5 – 8) $\div$ 4.5 or (their 42 – 10.5) $\div$ 4.5
9	$\frac{a(2-t)}{3}$ <b>cao oe</b>	3	<b>M1</b> correct re-arrangement to isolate the term in $w$ <b>M1</b> correct multiplication by $a$ <b>M1</b> correct division by their 3 An incorrect answer scores a maximum of <b>M2</b>
10	10	3	<b>M1</b> $T = k\sqrt{l}$ <b>A1</b> for $k = 2$
11	17.05 <b>cao www</b>	4	<b>M1</b> for $280 \times (1 + \frac{3}{100})^2$ oe <b>M1</b> subtracting 280 from $280(1 + \frac{k}{100})^2$ any $k$ <b>A1</b> for 17.052 or <b>SC2</b> 297.05 on answer line

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – May/June 2012	0580	23

12 (a)	$\frac{11}{12} - \frac{4}{12}$ oe $\frac{7}{12}$ cao ww 0	2	M1 correct use of a common denominator  A1
(b)	$\frac{1}{4} \times \frac{13}{11}$ oe $\frac{13}{44}$ cao ww 0	2	M1 inversion and operation change  A1
13 (a)	71	2	M1 for $7 \times 8 - 3 \times -5$ or B1 56 and -15
(b)	$3v(u + 3w)$ final answer	2	B1 for $3(uv + 3vw)$ or $v(3u + 9w)$ As final answer
14 (a)	$64p^3q^6$	2	B1 $64p^uq^v$ or $kp^3q^6$
(b)	$0.5x^{-2}$ or $\frac{1}{2x^2}$ oe	2	B1 $\frac{1}{2x^u}$ oe or $\frac{1}{kx^2}$ oe
15	-3.44, 0.44 correct working must be shown	4	B1 for $\sqrt{(6)^2 - 4(2)(-3)}$ or better seen B1 if in form $\frac{p + (or-)q}{r}$ , for $p = -6$ and $r = 2 \times 2$ oe B1, B1 (SC1 -3.4 or -3.436... and 0.4 or 0.436...)
16	359 www	4	M1 $\pi \times 4^2$ or $\frac{1}{2}\pi \times 4^2$ M1 for $0.5 \times \pi \times 8 \times 15$ oe M1 for $8 \times 15 +$ their 2 ends + their curved surface area
17 (a)	(4 10)	2	B1 each element or correct without brackets
(b)	$\frac{1}{2} \begin{pmatrix} 3 & -4 \\ -1 & 2 \end{pmatrix}$ oe	2	B1 for $\frac{1}{2} \begin{pmatrix} a & c \\ b & d \end{pmatrix}$ or $k \begin{pmatrix} 3 & -4 \\ -1 & 2 \end{pmatrix}$ seen
18 (a)	$\mathbf{p} - \frac{1}{3}\mathbf{q}$ oe	2	M1 $\overrightarrow{QR} + \overrightarrow{RX}$ oe or $-\mathbf{q} + \mathbf{p} + (\frac{2}{3})\mathbf{q}$ oe
(b)	$\frac{1}{2}\mathbf{p} + \frac{5}{6}\mathbf{q}$ oe	2 ft	ft $\mathbf{q} + \frac{1}{2}$ their (a) but must be vectors or M1 for $\overrightarrow{OQ} + \overrightarrow{QM}$ oe
19	6(.00) www	4	M1 use of area = distance M1 complete, correct set of area statements, ignoring units M1 changing min to hours or km/h to km/min

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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20	$\frac{x+4}{x(x-5)}$ oe cao	5	<p><b>B2</b> <math>(x-5)(x+4)</math> seen or <b>SC1</b> <math>(x+a)(x+b)</math> where <math>ab = -20</math> or <math>a+b = -1</math></p> <p><b>B2</b> <math>x(x-5)(x-5)</math> or <b>B1</b> one of <math>x(x^2-10x+25)</math>, <math>(x-5)(x-5)</math>, <math>(x-5)(x^2-5x)</math> seen</p>
21 (a)	7.55 www	3	<p><b>M2</b> <math>(\frac{1}{2}\sqrt{(8^2+8^2)})^2 + 5^2</math> or <math>4^2 + 5^2 + 4^2</math> seen or <b>M1</b> <math>8^2 + 8^2</math> or <math>5^2 + 4^2</math> or <math>4^2 + 4^2</math> or <math>5^2 + (\text{their } MB)^2</math> seen</p>
(b)	41.5 www	3	<p><b>M2</b> <math>\sin(B) = \frac{5}{(a)}</math> or <math>\tan(B) = \frac{5}{\text{their } MB}</math> or <math>\cos(B) = \frac{\text{their } MB}{(a)}</math> or <b>M1</b> recognition of angle <math>PBM</math></p>