

CAMBRIDGE INTERNATIONAL EXAMINATIONS**Cambridge International General Certificate of Secondary Education****MARK SCHEME for the October/November 2015 series****0580 MATHEMATICS****0580/23**

Paper 2 (Extended), maximum raw mark 70

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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part marks
1	170 cao	1	
2	[0].101 or [0].1005 to [0].1006	1	
3	[0].00017	1	
4	6	1	
5 (a)	12, 15	1	
(b)	11, 13	1	
6	$5 - u$ final answer	2	B1 for $5 + ku$ or $j - u$, $k \neq 0$ as final answer
7	$2x(1 - 2x)$ final answer	2	B1 for $2(x - 2x^2)$ or $x(2 - 4x)$ as final answer
8	4140	2	M1 for $(25 - 2) \times 180$ or $25 \times \left(180 - \frac{360}{25}\right)$
9	23.6 or 23.57 to 23.58	2	M1 for $\sin[=]\frac{2}{5}$ oe
10 (a)	625	1	
(b)	9	1	
11 (a)	$\frac{3x}{2}$ oe final answer	1	
(b)	$\frac{x^2 + 2}{x}$ oe final answer	1	
12 (a)	10	1	
(b)	$P \cup Q'$ oe	1	
13	10	2	B1 for $7 \times 3 - 2 \times u$

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Question	Answer	Mark	Part marks
14	6	3	M2 for $4.5 \times \sqrt[3]{\frac{128}{54}}$ oe or better M1 for $\sqrt[3]{\frac{128}{54}}$ or $\sqrt[3]{\frac{54}{128}}$ oe or $\frac{54}{128} = \left(\frac{4.5}{x}\right)^3$ oe
15	Any two of $\frac{8}{12}, \frac{2}{12}$ or $\frac{3}{12}$ oe $\frac{8}{12} + \frac{2}{12} - \frac{3}{12}$ oe $\frac{7}{12}$	M1 M1 A1	M1 for any 2 correct over a common denominator e.g. $\frac{4}{6}$ and $\frac{1}{6}$ or SC2 for final answer $\frac{13}{12}$ or $1\frac{1}{12}$ with full working
16	$\frac{2(s-ut)}{t^2}$ oe final answer	3	M1 for correctly isolating term in a M1 for correctly multiplying by 2 (or -2) M1 for correctly dividing by t^2 (or $-t^2$)
17	$\frac{x^{16}}{2y^4}$ final answer	3	B2 for fraction as final answer with two of $x^{16}, 2, y^4$ correct and in correct position or B1 for fraction as final answer with one of $x^{16}, 2, y^4$ correct and in correct position
18	0.96 oe	3	M2 for $1 - 0.2 \times 0.2$ or $0.8 + 0.2 \times 0.8$ or $0.8 \times 0.8 + 0.8 \times 0.2 + 0.2 \times 0.8$ or B1 for one of $0.2 \times 0.2, 0.8 \times 0.8, 0.8 \times 0.2, 0.2 \times 0.8$ seen
19	$\frac{18}{(x+2)^2}$ oe	2	M1 for $y = \frac{k}{(x+2)^2}$ or better If zero scored SC1 for final answer of $y = \frac{k}{(x+2)^2}$ where $k \neq 0$ or 18
20	18 cao nfw	3	M2 for $\frac{877.5}{7.5 \times 6.5}$ or B1 for any two of 877.5, 7.5 and 6.5 seen

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Question	Answer	Mark	Part marks
21	$\sqrt{(4)^2 - 4(3)(-5)}$ or better seen if $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ seen then $p = -4$ and $r = 2(3)$ -2.12 0.79 final answers	B1 B1 B1 B1	If completing the square B1 for $\left(x + \frac{2}{3}\right)^2$ oe B1 for $-\frac{2}{3} + \sqrt{\frac{5}{3} + \frac{2^2}{3^2}}$ or $-\frac{2}{3} - \sqrt{\frac{5}{3} + \frac{2^2}{3^2}}$ If B0, SC1 for 0.786[299] and $-2.119[632]$ -2.1 and 0.8 or -2.120 or -2.119 and 0.786 or 2.12 and -0.79 final answers -2.12 and 0.79 seen not as final answers
22	$\frac{1}{2-5w}$ final answer nfw	4	B1 for $2(2+5w)$ B1 for $2(4-25w^2)$ B1 for $[2](2+5w)(2-5w)$ ALT method B3 for $\frac{4+10w}{(4+10w)(2-5w)}$ or B2 for $(4+10w)(2-5w)$
23 (a)	$\frac{1}{3}(-\mathbf{a} + \mathbf{b})$ oe	2	M1 for any correct route eg $AO+OB+\frac{2}{3}BA$ or B1 for $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ oe
(b)	$\frac{2}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ oe simplified	2FT	FT <i>their</i> $(\mathbf{a}) + \mathbf{a}$ simplified only if in terms of $\mathbf{a}$ and $\mathbf{b}$. M1 for identifying $\overrightarrow{OC}$ as position vector or correct route in any form or for correct unsimplified answer
24 (a)	6.2	1	
(b)	5.8	2	M1 for 24 soi
(c)	70	2	M1 for 10 soi
25	2.9[0] or 2.898 to 2.901	5	M4 for $\frac{30}{360} \times \pi \times 8^2 - 0.5 \times 8 \cos 30 \times 8 \sin 30$ or M1 for $\frac{30}{360} \times \pi \times 8^2$ and M2 for [area of triangle =] $0.5 \times 8 \cos 30 \times 8 \sin 30$ oe or M1 for $\frac{OC}{8} = \cos 30$ oe or $\frac{BC}{8} = \sin 30$ oe

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26	(a)	12.5 oe	2	M1 for $45 \times 1000 \div 60 \div 60$ oe
	(b)	1.25 oe	1FT	FT <i>their</i> (a) $\div 10$
	(c)	312.5 oe	3FT	FT for $25 \times \textit{their} (a)M2 for 20 \times \textit{their} 12.5 + 0.5 \times 10 \times \textit{their} 12.5 oeor M1 for one correct relevant area calculationor SC2 for final answer 1125$