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 $7 \times 3 - 2 \times u$

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 0.2×0.2, 0.8×0.8, 0.8×0.2, 0.2×0.8 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 nfww	**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

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 nfww	**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** *their* **(a)** + **a** simplified only if in terms of **a** and **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 $\frac{30}{360}\times\pi\times8^2 - 0.5\times8\cos30\times8\sin30$ or **M1** for $\frac{30}{360}\times\pi\times8^2$ and **M2** for [area of triangle =] $0.5\times8\cos30\times8\sin30$ oe or **M1** for $\frac{OC}{8} = \cos30$ oe or $\frac{BC}{8} = \sin30$ oe

26	**(a)**	12.5 oe	**2**	**M1** for $45 \times 1000 \div 60 \div 60$ oe
	(b)	1.25 oe	**1FT**	**FT** *their* **(a)** $\div 10$
	(c)	312.5 oe	**3FT**	**FT** for $25 \times$ *their* **(a)** **M2** for $20 \times$ *their* $12.5 + 0.5 \times 10 \times$ *their* 12.5 oe or **M1** for one correct relevant area calculation or **SC2** for final answer 1125