CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0444 MATHEMATICS (US)

0444/23   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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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		-7	**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 final answer $5 + ku$ or $j - u$, $k \neq 0$
7		$2x(1 - 2x)$ final answer	**2**	**B1** for final answer $2(x - 2x^2)$ or $x(2 - 4x)$
8		1800	**2**	**M1** for $(12 - 2) \times 180$ or $12 \times \left(180 - \dfrac{360}{12}\right)$
9		2	**1**	
		720	**1**	If zero scored **SC1** for correct answers reversed
10	**(a)**	125	**1**	
	(b)	$\dfrac{1}{27}$	**1**	
11	**(a)**	$\dfrac{3x}{2}$ final answer	**1**	
	(b)	$\dfrac{x^2 + 2}{x}$ final answer	**1**	
12		5.4×10^{12}	**2**	**M1** for figs 54 or 0.6×10^{12} or 60×10^{11}
13		$x < 2$ oe	**2**	**B1** for $3 + 1 < 2x$ or $-2x > -1 - 3$ or better

14	6	3	**M2** for $4.5 \times \sqrt[3]{\dfrac{64}{27}}$ oe or better **M1** for $\sqrt[3]{\dfrac{64}{27}}$ or $\sqrt[3]{\dfrac{27}{64}}$ oe or $\dfrac{27}{64} = \left(\dfrac{4.5}{x}\right)^3$ oe
15	$\dfrac{7}{12}$	3	**M2** for $\dfrac{8}{12} + \dfrac{2}{12} - \dfrac{3}{12}$ oe or **B1** for any 2 correct over a common denominator or **SC2** for final answer $\dfrac{13}{12}$ or $1\dfrac{1}{12}$
16	$\dfrac{2(s - ut)}{t^2}$ 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	$\dfrac{x^{16}}{2y^4}$ 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	$\dfrac{1}{2}$ oe	3	**M2** for $2(1 + 2)^2 = y(4 + 2)^2$ oe or **M1** for $y = \dfrac{k}{(x + 2)^2}$ or better **A1** for $k = 18$
19 (a)	12	1	
(b)	$5\sqrt{6}$	2	**B1** for $2\sqrt{6}$ or $3\sqrt{6}$ seen or answer $5\sqrt{2}\sqrt{3}$
20	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

21	$[p =] - 2$ $[q =]\ 3$	3	**B2** for $\dfrac{-4 \pm \sqrt{(4)^2 - 4(3)(-5)}}{2(3)}$ or better **or** $\dfrac{-2 \pm \sqrt{19}}{3}$ or **B1** for $\sqrt{(4)^2 - 4(3)(-5)}$ or better seen **or** $\dfrac{-4 \pm \sqrt{k}}{2(3)}$ seen
22	$\dfrac{1}{2 - 5w}$ nfww	4	**B1** for $2(2 + 5w)$ **B1** for $2(4 - 25w^2)$ **B1** for $[2](2 + 5w)(2 - 5w)$ Alternative method **B3** for $\dfrac{4 + 10w}{(4 + 10w)(2 - 5w)}$ or **B2** for $(4 + 10w)(2 - 5w)$
23	$y = \dfrac{5}{2} x + 2$ oe	4	**B1** for (0, 2) soi and **M2** for correct rearrangement to $y = -\dfrac{2}{5} x + 2$ or **M1** for attempt at rearrangement allowing 1 error If M2 not scored allow **M1ft** for negative reciprocal of *their* gradient
24 (a)	6.2	1	
(b)	5.8	2	**M1** for 24 soi
(c)	70	2	**M1** for 10 soi
25	$\dfrac{30}{360} \times \pi \times 8^2$ [area of triangle =] $0.5 \times 8 \cos30 \times 8 \sin30$ oe completion to give answer with no errors $\dfrac{16\pi}{3} - 8\sqrt{3}$	**M2** **M2** **A1**	or **M1** for $\dfrac{30}{360}$ oe or $\pi \times 8^2$ or **M1** for $\dfrac{OC}{8} = \cos30$ oe or $\dfrac{BC}{8} = \sin30$ oe must see [cos30 =] $\dfrac{\sqrt{3}}{2}$ and [sin30 =] $\dfrac{1}{2}$

26	(a)		5	2	**M1** for $(-4)^2 + 3^2$ oe
	(b)	(i)	$\frac{1}{3}(-\mathbf{a}+\mathbf{b})$ oe	2	**M1** for any correct route eg $AO + OB + \frac{2}{3}BA$ or **B1** for $\overrightarrow{AB} = -\mathbf{a}+\mathbf{b}$ oe
		(ii)	$\frac{2}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ oe	2FT	**FT** *their*(**a**) + **a** simplified only if in terms of **a** and **b** **M1** for correct route in any form or for correct unsimplified answer