CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 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

	Answer	Mark	Part marks
1	28 500	**2**	**M1** for 300 × 95
2	$3.6\% < 0.34 < 0.6^2 < \frac{3}{5}$	**2**	**B1** for 0.6, 0.36, 0.036 or converting to % or for 3 values in correct relative positions
3	2.4×10^8	**2**	**B1** for $k \times 10^8$ or 2.4×10^k or 240 000 000
4	30	**2**	**M1** for $2x + 3x + 4x + 90 = 360$ oe
5	70	**2**	**M1** for $56 \div 0.8$ oe
6	512	**2**	**B1** for 8^3
7	1, 2, 5	**2**	**SC1** for 5, 2, 1, 2, 5 or 1, 2, 5 with extras
8	$7\sqrt{5}$	**2**	**B1** for $4\sqrt{5}$ or $3\sqrt{5}$ seen
9	60, 120	**2**	**B1** for 60 or 120 seen
10	9.5 or $\frac{19}{2}$	**3**	**M2** for $2x = (8 \times 3) - 5$ or better oe or **M1** for $2x + 5 = 8 \times 3$ or better
11	160	**3**	**M2** for $180 - \frac{360}{18}$ or $\frac{180 \times (18-2)}{18}$ or **M1** for $180 \times (18 - 2)$ or $\frac{360}{18}$
12	$8 + (y - 2)^2$ oe final answer	**3**	**M1** for $y - 2 = \sqrt{(x - 8)}$ **M1** for squaring both sides completed correctly **M1** for adding *their* 8 completed correctly on answer line
13	4	**3**	**M2** for $6(3 + 5) = y(7 + 5)$ oe or **M1** for $y = \frac{k}{x+5}$ oe **A1** for $k = 48$
14	3, 180, 0	**3**	**B1** each

15	13 230	**3**	**B2** for 600 + 630 oe seen or **M2** for 12 000 × $(1.05)^2$ oe or **M1** for 5% of 12 600 attempted soi (e.g by 630)
16 (a)	3025 cao	**2**	**M1** for $\frac{1}{4} \times 10^2 \times (10 + 1)^2$
(b)	$2n^2(n + 1)^2$ oe	**1**	
17	$\frac{16x^2 + 18x + 9}{6x}$ final answer	**4**	**M2** for 9 [+] $4x^2$ [+] $18x$ [+] $12x^2$ or better or **M1** for 2 of these and **M1FT** for adding their four 'numerators' together correctly and **B1** for denominator $6x$ to a maximum of **3** marks
18 (a)	$\frac{1}{2}\mathbf{b} - \frac{1}{2}\mathbf{a}$ oe	**2**	**M1** for $\frac{1}{2}(\overrightarrow{AO} + \overrightarrow{OB})$ oe or correct unsimplified route eg $\overrightarrow{AO} + \overrightarrow{OB} + \overrightarrow{BP}$ or $-\mathbf{a} + \mathbf{b} + \frac{1}{2}\overrightarrow{BA} = -\mathbf{a} + \mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$
(b)	$\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$ oe	**2**	**M1** for $\overrightarrow{OA} + \overrightarrow{AQ}$ oe or correct unsimplified route
19 (a)	Reflection $y = x$	**1** **1**	
(b)	Triangle at (3, 3) (6, 3) and (3, 5)	**2**	**M1** for any two vertices correct or correct answer translated horizontally
20 (a)	64	**2**	**B1** for [f(1) =] 4 or **M1** for $((x - 3)^2)^3$ or better
(b)	$4x + 1$ oe	**2**	**M1** for $x = \frac{y - 1}{4}$ or $4y = x - 1$
(c)	$\frac{x^3 - 1}{4}$ oe final answer	**1**	
(d)	3 nfww	**1**	
21 (a)	3.08 to 3.22 nfww	**2**	**B1** for 502.5 to 502.62 or 505.7 to 505.8
(b)	$\frac{16}{200}$ oe	**2**	**B1** for 16 soi or **M1** for $\frac{\textit{their}16}{200}$
(c)	18.5 26 3	**2**	**B1** for 18.5 and 26 **B1** for 3

22	**(a)**	13	**4**	**B3** for $\frac{53}{4}$ oe or **M2** for $636\pi \div \left(\frac{1}{3}\pi \times 4^2 \times 9\right)$ oe or **M1** for $\left(\frac{1}{3}\pi \times 4^2 \times 9\right)$
	(b)	12π	**3**	**B2** for $0.25 \times \left(\frac{1}{3}\pi \times 4^2 \times 9\right)$ or $636\pi - (13 \times 48\pi)$ or **M1** for *their remainder* $\times \left(\frac{1}{3}\pi \times 4^2 \times 9\right)$ or 636π – (*their*$13 \times 48\ \pi$)