Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS (US) **0444/31**

Paper 3 (Core) **May/June 2016**

MARK SCHEME

Maximum Mark: 104

Published

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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 (a) (i)	3	**1**	
(ii)	36 or 72	**1**	Accept both for 1 mark
(iii)	49	**1**	
(iv)	27	**1**	
(v)	6	**1**	
(b) (i)	43	**1**	
(ii)	50	**1**	
(c)	$\frac{2}{3}3$	**1**	
(d) (i)	$3^2 \times 5$ or $3 \times 3 \times 5$	**2**	**B1** for 3 and 5 only identified as factors or for a correct product e.g. 9×5 or 3×15
(ii)	15	**2**	**M1** for $3 \times 5 \times 7$ [= 105] or **B1** for 3 or 5 as final answer
2 (a) (i)	$\frac{2}{5}$ oe	**1**	Allow 0.4, 40%
(ii)	$\frac{3}{5}$ oe	**1**	Allow 0.6 , 60%
(iii)	0	**1**	
(b) (i)	4	**1**	
(ii)	4.3	**2**	**M1** for their total $86 \div 20$

Question	Answer	Mark	Part marks
(iii) (a)	$\frac{3}{20}\times 360$	1	
(b)	90	2	**M1** for $\frac{5}{20}$ oe or $\frac{360}{20}$ oe implied by 18 seen
(c) (i)	14	2	**M1** for $\frac{168}{360}$ oe or $\frac{360}{30}$ oe implied by 12 seen
(ii)	43.3	3	**B1** for [total angle=] 156° **M1** for $\frac{\textit{their angle}}{360}[\times 100]$ oe If B0M0 **SC1** for 53.3
(iii)	5	2	**M1** for $\frac{10}{100}\times 360$ oe or 36
3 (a)	7034.16	3	**M2** for 14 × 237 × 2 × 1.06 oe or **M1** for 14 × 237 × 2 oe or 237 × 1.06 oe or 237 × 2 × 1.06 oe or 237 × 1.06 × 14 oe
(b)	4.22	2	**M1** for 20 – 2 × 7.89
(c)	16 08 or 4 08 pm	2	**B1** for 45 min soi
(d)	03 00 or 3 am	3	**M1** for 270 ÷ 32.4 or 8.33[…] or 8 (h) 20 (min) **M1dep** for 18 40 + *their* 8.33
(e)	1000	2	**M1** for $\frac{1800}{4+5}$ [×5] oe
4 (a) (i)	8	1	
(ii)	–2	3	**M1** for first step correctly completed **M1FT** for second step correctly completed
(b) (i)	$19x + 117$	2	**B1** for $19x + c$ or $mx + 117$
(ii)	$15x + 625 = \textit{their}$ (b)(i) 127	1 2	**M1FT** for the first correct step of *their* linear equation
5 (a) (i)	Wednesday	1	
(ii)	5	1	accept –5
(iii)	–3 –2 –1 0 1 2 5	1	

Question	Answer	Mark	Part marks
(iv)	–6	1	
(b) (i)	2 million or 2 000 000	1	
(ii)	3	2	**B1FT** for an answer of 3.039 or 3.04 or 3.0 or 6078000 ÷ *their* (b)(i)
(c)	28.3 or 28.27 to 28.28	4	**B1** for radius of 5 cm or 4 cm soi **M2** for $\pi \times 5^2 - \pi \times 4^2$ soi or **M1** for $\pi \times 5^2$ or $\pi \times 4^2$ soi If 0 scored **SC2** for $\pi \times 10^2 - \pi \times 8^2$ or **SC1** for $\pi \times k^2$
6 (a) (i)	[0]67	1	
(ii)	135	2	**B1** for 9 (cm)
(iii)	Correct diagram	2	**B1** for correct bearing **B1** for correct length
(b) (i)	29	1	
(ii)	252	2FT	**M1FT** for 180 + 43 + *their* (b)(i)
(c)	445	2	**M1** for $267^2 + 356^2$ or better
7 (a) (i)	73.38	3	**B1** for 5.4 or 4.7 soi **M1** for a completely correct method
(ii)	160 000	2FT	**B1FT** for *their* (a)(i) × 2175 or 159601.5[0]
(b)	45.8 or 45.80 to 45.81	2	**M1** for tan [=] 1.8 ÷ 1.75
(c)	53 060.4[0]	3	**M2** for $50\,000 \times 1.02^3$ oe or **M1** for two years compound interest eg $50\,000 \times 1.02^2$ oe implied by 52 020
(d)	10	3	**M2** for $(\frac{198000}{180000} \times 100) - 100$ oe or $(\frac{198000 - 180000}{180000}) \times 100$ or **M1** for $\frac{198000}{180000}[\times 100]$ oe or figs 11 or **B1** for 198 000 – 180 000 or 18 000 seen

Question	Answer	Mark	Part marks
8 (a)	… 14 … 20 20 … 14 … 0	**3**	**B2** for 3 or 4 correct **B1** for 2 correct
(b)	Completely correct curve	**4**	**B3FT** for 8 or 9 points correctly plotted or **B2FT** for 6 or 7 points correctly plotted or **B1FT** for 4 or 5 points correctly plotted
(c)	(3.5, *h*)	**1**	$20 < h \leqslant 20.4$
(d) (i)	Correct **ruled** line	**1**	
(ii)	1.4 5.6	**1, 1FT**	**FT** *their* graph and line
9 (a)	Correct image, points at (0,–3), (0,–1), (2,–3) and (4,–1)	**2**	**B1** for one correct movement either horizontal or vertical
(b) (i)	Correct image, points at (0, 6), (8, 6), (4, 2) and (0, 2)	**2**	**B1** for correct scale factor and orientation but incorrect centre
(ii)	$\frac{1}{2}$	**1**	
(c)	Reflection [in mirror line] $x = -1$ oe	**1** **1**	
(d)	Rotation [centre] (0, 0) oe [angle] 180° oe	**1** **1** **1**	**SC1,1,1** for Enlargement , SF = –1, centre (0, 0)