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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **October/November 2016**

MARK SCHEME

Maximum Mark: 120

Published

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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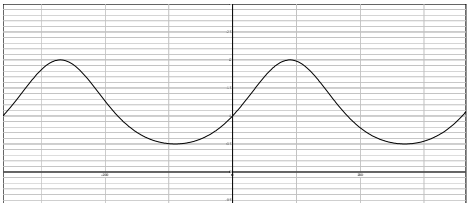
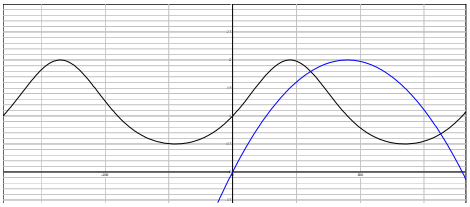
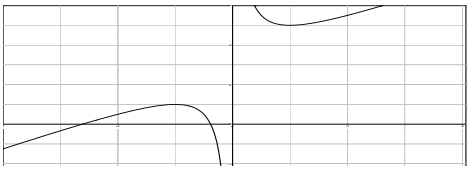
Abbreviations

awrt answers which round to
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

Qu.	Answer	Mark	Part Marks
1 (a)	201	**2**	**M1** for 2500 ÷ 12.43 (implied by 201.1…)
(b) (i)	783 or 782.5 to 783.3….	**3**	**B1** for 10h 40min oe 10.66..., 10.67, $10\frac{2}{3}$, 640 **M1** for 8350 ÷ *their* journey time
(ii)	[0]8 05 oe	**1**	
(iii)	7	**3**	**M2** for (36.8 – 20) ÷ 2.4 oe or **M1** for 20 + 2.4 × distance = 36.8 oe
2 (a) (i)	$\begin{pmatrix}-8\\-5\end{pmatrix}$	**1**	
(ii)	Image at (–4, –1), (2, –1), (2, 3)	**2FT**	**SC1FT** for translation $\begin{pmatrix}-8\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-5\end{pmatrix}$
(iii)	9.43 or 9.433 to 9.434	**2**	**M1** for $(their(-8))^2 + (their(-5))^2$ oe
(b) (i)	Reflection *y*-axis oe	**1** **1**	
(ii)	Enlargement 0.5 oe (10, –10)	**1** **1** **1**	
(iii)	Stretch [factor] 0.25 oe *x*-axis oe invariant	**1** **1** **1**	
3 (a)	Correct sketch 	**3**	**B1** for shape including 2 minimum points and 2 maximum points **B1** for all above *x*-axis
(b)	$0.5 \leqslant f(x) \leqslant 2$	**2**	Allow written separately or in words **B1** for each **SC1** for $0.5 \leqslant x \leqslant 2$

Qu.	Answer	Mark	Part Marks
(c) (i)	1	1	
(ii)	2	1	
(d) (i)	–90, 270, 630, 990	2	**B1** for –90 and 270 with no others from –360 to 360
(ii)	$360n - 450$ oe	2FT	**FT** only if clear linear sequence **B1FT** for $360n + k$ or $kn - 450$
(e) (i)	Correct sketch 	2	**B1** for parabola vertex upwards
(ii)	122.4 or 122 or 122.4… 326.2 or 326 or 326.2…	1 1	
4 (a)	$\frac{\frac{2}{3}\pi \times 9^3}{\frac{1}{3}\pi \times 9^2}$ or equation with parts clearly cancelled leaving 2 and 9	M2	**M1** for $\frac{1}{3}\pi \times 9^2 \times h = \frac{2}{3}\pi \times 9^3$ oe
(b) (i)	763 or 764 or 763.4 to 763.5…	2	**M1** for $\pi \times 9^2 + 2\pi \times 9^2$ or **SC1** for 509 or 508.9 to 509.0… or 162π
(ii)	569 or 569.0 to 569.1	3	**M2** for $\pi \times 9 \times \sqrt{9^2 + 18^2}$ or **M1** for $9^2 + 18^2$
(c)	45	3	**M2** for $\frac{\frac{2}{3}\pi \times 9^3}{\frac{4}{3}\pi \times 2^3}$ or equation with parts clearly cancelled (implied by 45.56 to 46) or **M1** for $\frac{4}{3}\pi \times 2^3 \times n = \frac{2}{3}\pi \times 9^3$
5 (a)	$18 - x + x + 12 - x + 3 = 25$ oe Completion to $x = 8$ with at least one step	M1 A1	**B1** for Venn diagram completed with the 10, 8, 4 and 3
(b) (i)	$\frac{22}{25}$ oe	1	0.88
(ii)	$\frac{21}{25}$ oe	1	0.84

Qu.		Answer	Mark	Part Marks
	(c)	$\frac{8}{18}$ oe	1	$\frac{4}{9}$, 0.4444…
	(d)	element chosen from Q is also in P oe	1	
6	(a)	$y = \frac{2}{3}x + \frac{5}{3}$ oe	5	**B1** for (2, 3) seen **B1** for gradient of $AB = -\frac{3}{2}$ **B1FT** for gradient = $\frac{2}{3}$ **M1** for correct method in finding c.
	(b)	$1\frac{1}{3}$ oe	2	**FT** 3 – *their* $\frac{5}{3}$ in (a) (but not if 0) **M1** for 3 – *their* $\frac{5}{3}$ in (a)
7	(a)	42.[0] or 41.98 to 41.99	2	**M1** for tan = $\frac{9}{10}$ oe
	(b)	tan = $\frac{\sqrt{9^2+10^2}}{20}$ oe 33.91 to 33.93	M2 A1	or **M1** for $\sqrt{9^2+10^2}$ or $\sqrt{9^2+10^2+20^2}$
	(c)	12.4 or 12.39 to 12.40... nfww	3	**M1** for $20^2 + 22^2 - 2\times 20\times 22\cos 33.9$ **A1** for 153 to 154
8	(a)	Correct sketch 	2	**B1** for one correct branch
	(b)	–2.62 or –2.618… –0.382 or –0.3820 to –0.3819	1 1	If 0 scored, **M1** for correct use of quadratic formula oe
	(c)	$x < -2.62$ $-0.382 < x < 0$	1FT 2FT	**FT** only if 2 negative roots in (b) **FT** only if 2 negative roots in (b) **B1** each
	(d)	[a =] 0 [b =] 3	1 1	
	(e)	Translation $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ oe	1 1	

Qu.	Answer	Mark	Part Marks
9 (a)	18, 20, 15, 20, 20	**3**	**B2** for 4 correct **B1** for 3 correct
(b)	3.3[0] or 3.295 to 3.296	**2FT**	**M1** for at least 3 mid-values seen, 0.5, 1.5, 2.5, 4, 7.5 If 0 scored, **SC1** for 2.26 or 2.258… or for 4.33 or 4.333… or $4.\dot{3}$
(c)	0.649 cao	**2**	**M1** for $\frac{their75}{their93}\times\frac{their74}{their92}$ (implied by $\frac{5550}{8556}$ or 0.6486 to 0.6487 oe)
10 (a)	$\frac{9}{7}$ oe	**2**	**M1** for $7x = 11 - 2$ oe
(b)	$\frac{5x+1}{6}$ final answer	**2**	**M1** for $3(x + 1) + 2(x – 1)$ seen
(c) (i)	$\frac{2x}{y^2}$ final answer	**2**	**B1** for 2 terms correct
(ii)	$\frac{x+3}{x+1}$ final answer	**4**	**B1** for $(x – 3)(x + 3)$ **B2** for $(x – 3)(x + 1)$ or or **SC1** for $(x + a)(x + b)$ where $ab = –3$ or $a + b = –2$
11 (a)	2	**2**	**B1** for [f(33) =] 100 or **M1** for $\log(3x+1)$
(b)	$\frac{1}{100}$ or [0].01	**2**	**M1** for g(x) = 3(–1) + 1 oe
(c) (i)	$\frac{x-1}{3}$ oe	**2**	**M1** for $x = 3y + 1$ or $y - 1 = 3x$
(ii)	10^x	**2**	**M1** for $x = \log y$ or $10^y = x$
12 (a) (i)	12	**3**	**M2** for $\frac{1540-1375}{1375}\times 100$ oe or **M1** for $\frac{1540}{1375}\times 100$ or for $\frac{1540-1375}{1375}$
(ii)	89.3 or 89.28 to 89.29	**1**	
(iii)	1250	**3**	**M2** for 1375 ÷ 1.1 oe or **M1** for associating 1375 with 110%

Qu.	Answer	Mark	Part Marks
(b) (i)	$500 + \frac{500 \times 3 \times 5}{100}$ oe 500×1.025^5	**M2 and M1**	or **M1** for $\frac{500 \times 3 \times 5}{100}$ oe (575, 565.704…)
		or	
	$500 \times 1.025^5 - 500$ $\frac{500 \times 3 \times 5}{100}$	**M2 and M1**	or **M1** for 500×1.025^5 (65.704…, 75)
	amount – amount or interest – interest	**M1**	
	9.3[0] or 9.295 to 9.296	**A1**	
(ii)	16	**4**	**B3** for final answer of 15 or 15.28 to 15.29 seen or 15 reached by trial and improvement or **M2** for sketch leading to answer or trial and improvement with at least two steps beyond 5 years or **M1** for $500 + \frac{500 \times 3 \times x}{100} = 500 \times 1.025^x$ oe , implied by one trial