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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 2017**

MARK SCHEME

Maximum Mark: 120

Published

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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

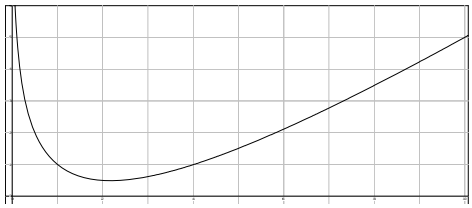
awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

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Question	Answer	Marks	Part Marks
1(a)	Image at (0, 5), (3, 5), (3, 3)	**2**	**SC1** for translation $\begin{pmatrix}-2\\k\end{pmatrix}$ or $\begin{pmatrix}k\\7\end{pmatrix}$
1(b)(i)	Image at (2, 2), (5, 2), (5, 4)	**1**	
1(b)(ii)	Image at (– 4, – 2), (– 7, – 2), (– 7, – 4)	**1**	
1(b)(iii)	Rotation 180 [centre] (– 1 , 0)	**3**	**B1** for each
1(c)	Stretch [factor]2 *x*-axis oe invariant	**3**	**B1** for each
2(a)(i)	44	**2**	**M1** for [angle *BAC* or *DEC* =] 180 – 2 × 68, soi by angle *CDE* = 44 or **M1** for angle *BAC* = *their* angle *CDE*
2(a)(ii)	isosceles	**1**	
2(b)	162	**3**	**M2** for $180 - \frac{360}{20}$ or $\frac{180\times(20-2)}{20}$ or **M1** for $\frac{360}{20}$ or 180 × (20 – 2)
2(c)(i)	Angle sum of triangle oe	**1**	
2(c)(ii)(a)	similar	**1**	
2(c)(ii)(b)	5.4	**2**	**M1** for $\frac{5}{3}=\frac{9}{QR}$ oe
3(a)(i)	6.5	**1**	
3(a)(ii)	4.5	**1**	
3(a)(iii)	3	**1**	
3(b)(i)	Positive	**1**	
3(b)(ii)	13	**1**	
3(b)(iii)	15.5	**1**	
3(b)(iv)	7.32*t* – 55.3	**2**	(7.322 to 7.323)*t* – (55.25…) **B1** for 7.32*t* + *k* or *kt* – 55.3 or **SC1** for 7.3*t* – 55
3(b)(v)	Correct line (positive gradient and not below the *x*-axis)	**2**	**B1** for positive gradient

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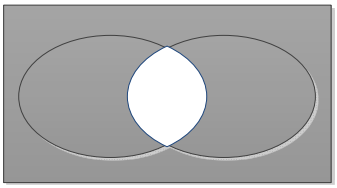
Question	Answer	Marks	Part Marks
4(a)(i)	5 : 4	**2**	**B1** for any other correct ratio
4(a)(ii)	41.68	**2**	**M1** for 0.16 × 260.5[0] oe
4(a)(iii)	12.5[0]	**3**	**M2** for 11.25 ÷ 0.9 oe or **M1** for recognising 11.25 as 90%
4(a)(iv)	300 nfww	**3**	**M2** for $\frac{200\times2\times25}{100}+200$ oe or **M1** for $\frac{200\times2\times25}{100}$ oe (implied by 100 nfww)
4(a)(v)	311.72	**3**	**M2** for 190×1.02^{25} oe or **M1** for 190×1.02^{n} oe where $n > 1$
4(b)	17	**3**	**B2** for 16.5 or 16.52 to 16.53 or **M2** for $\frac{\log\left(\frac{300}{120}\right)}{\log1.057}$ or appropriate sketch or $120\times1.057^{n} = 300$ **and** at least 2 trials which reach from 250 to 350 or **M1** for 120×1.057^{n} [= 300]
5(a)	804 or 804.2 to 804.4	**3**	**M1** for $\frac{1}{3}\pi\times8^{2}\times16$ **M1** for $\frac{4}{3}\pi\times4^{3}$
5(b)	450 or 449.5 to 449.6…	**3**	**M2** for $\pi\times8\times\sqrt{8^{2}+16^{2}}$ or **M1** for $\sqrt{8^{2}+16^{2}}$ or $\pi\times8\times$*their l*

Question	Answer	Marks	Part Marks
5(c)	8.94 or 8.944…	**4**	P is point of contact between slant edge and circle. **B2** for $PV = 8$ nfww or **M1** for $\frac{8}{4} = \frac{16}{PV}$ oe **M1** for $OV^2 = 4^2 + PV^2$ OR **B2** for $l = \sqrt{320}$ oe or **M1** for $l^2 = 8^2 + 16^2$ **M1** for $\frac{8}{4} = \frac{l}{OV}$ soi OR x is semi-vertical angle of cone **M1** for $\tan x = \frac{8}{16}$ oe **M2** for $\frac{4}{\sin x}$ or **M1** for $\frac{4}{OV} = \sin x$
6(a)	Correct sketch 	**2**	**B1** for correct shape
6(b)	(2.17, 0.488) or (2.171…, 0.4877…)	**2**	**B1** for each
6(c)	$0.488 \leqslant f(x) \leqslant 1.51$ or $0.4877... \leqslant f(x) \leqslant 1.505...$	**2**	**FT** *their* 0.488 **B1** for $0.488 \leqslant f(x)$ oe or $f(x) \leqslant 1.51$ oe
6(d)	0.502 or 0.5015… 5.83 or 5.827…	**2**	**B1** for each
6(e)	$0.502 < x < 5.83$ or $0.5015... < x < 5.827...$	**1**	**FT** *their* (d)
6(f)(i)	15.[0] or 15.00… 25.[0] or 25.00… 35. [0] or 35.00…	**1**	
6(f)(ii)	[an] asymptote oe	**1**	

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Question	Answer	Marks	Part Marks
7(a)	9.77 or 9.766…	**3**	**M2** for $\frac{8}{\cos 35}$ oe or **M1** for $\cos 35 = \frac{8}{AB}$ oe
7(b)	60.6 or 60.61…	**3**	**M2** for $\frac{6^2+9^2-8^2}{2\times 6\times 9}$ or **M1** for $8^2 = 6^2+9^2-2\times 6\times 9\cos C$
8(a)	10	**1**	
8(b)	4	**2**	**M1** for [h(1) =] $\frac{1}{2}$ or for [gh(x) =] $3 + 2\left(\frac{1}{x+1}\right)$
8(c)	$5x^2+12x+11$	**3**	**M1** for $(3+2x)^2+1+x^2+1$ **B1** for $9+6x+6x+4x^2$ or better for $(3+2x)^2$
8(d)	$\frac{1}{x}-1$ or $\frac{1-x}{x}$ oe final answer	**3**	**M1** correct first step **M1** correct second step
8(e)(i)	– 1	**2**	**M1** for $3 + 2x = 1$
8(e)(ii)	5	**1**	
9(a)	15, 7, 12 correctly placed	**2**	**B1** for two correctly placed or **M1** for 41 – (40 – 6) seen oe or correct equation
9(b)(i)	7	**1**	**FT** *their* Venn diagram
9(b)(ii)	28	**1**	**FT** *their* Venn diagram
9(c)	15	**1**	**FT** *their* Venn diagram
9(d)	$\frac{462}{1560}$ oe	**2**	**M1** for $\frac{22}{40}\times\frac{21}{39}$
9(e)(i)	$\frac{7}{19}$	**1**	**FT** *their* Venn diagram
9(e)(ii)	$\frac{168}{342}$ oe	**3**	**M2** for $\frac{\textit{their}\,7}{19}\times\frac{\textit{their}\,12}{18}+\frac{\textit{their}\,12}{19}\times\frac{\textit{their}\,7}{18}$ oe or **M1** for one of these products
9(f)	8	**3**	**M2** for $\frac{\textit{their}\,7+n}{40+n}=\frac{5}{16}$ oe or **M1** for at least two trials

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Question	Answer	Marks	Part Marks
9(g)		**1**	
10(a)(i)	3.0875	**2**	**M1** for 2.75, 3.125, 3.5 soi
10(a)(ii)	Correct histogram	**3**	**B1** correct widths **B1** for two correct heights
10(b)(i)	$\frac{200}{x}-\frac{200}{x+10}=\frac{20}{60}$ oe	**B2**	**B1** for $\frac{200}{x}$ or $\frac{200}{x+10}$
	$60\times200(x+10)-60\times200x=20x(x+10)$ oe	**M1**	i.e. correctly clearing fractions or all over common denominator
	$x^2+10x-6000=0$	**A1**	completion with at least one interim line and without any errors or omissions
10(b)(ii)	2 h 45 min	**4**	**B2** for 72.6 or 72.62… or **M1** for correct use of formula or correct sketch **M1** for 200 ÷ *their* positive x, implied by 2.75.....
11(a)(i)	$-\mathbf{a}+\mathbf{b}$ oe	**1**	
11(a)(ii)	$-\frac{1}{4}\mathbf{a}+\frac{1}{4}\mathbf{b}$ oe	**1**	**FT** *their* (i)
11(a)(iii)	$\frac{3}{4}\mathbf{a}+\frac{1}{4}\mathbf{b}$ oe	**2**	**B1** for correct unsimplified answer or a correct route
11(b)	(6.5, 1.5)	**3**	**FT** *their* (a)(iii) **B2** for $\begin{pmatrix}6.5\\1.5\end{pmatrix}$ or **M1** for $\frac{3}{4}\times\begin{pmatrix}8\\0\end{pmatrix}+\frac{1}{4}\times\begin{pmatrix}2\\6\end{pmatrix}$ OR **B2** for (5, 3) at M or [$\overrightarrow{OM}$ =] $\begin{pmatrix}5\\3\end{pmatrix}$ or **B1** for (k, 3) or (5, k) at M or [$\overrightarrow{OM}$ =] $\begin{pmatrix}k\\3\end{pmatrix}$ or $\begin{pmatrix}5\\k\end{pmatrix}$

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