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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **May/June 2016**

MARK SCHEME

Maximum Mark: 120

Published

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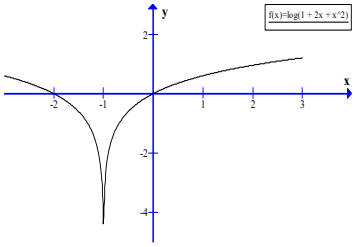
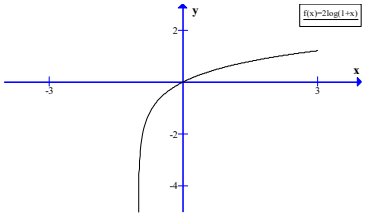
Abbreviations

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

Question	Answer	Mark	Part Marks
1 (a) (i)	16 000	3	**M2** for 13600 ÷ 0.85 oe or **M1** for 13600 = 85%
(ii)	9590 or 9587 to 9588	3	**M2** for 13600×0.89^3 oe or **M1** for 13600×0.89^k, $k > 1$ oe
(b)	9 years nfww	3	**M2** for $\dfrac{\log\left(\dfrac{11500}{23000}\right)}{\log 0.92}$ or $23\,000 \times 0.92^n = 11\,500$ **and** appropriate sketch or at least 2 valid trials or **M1** for $23\,000 \times 0.92^n$ [= 11500] If 0 scored **SC2** for 8 nfww or 8.3(1295..) nfww
2 (a)	$\dfrac{300}{L}$ oe	3	**M1** for $f = \dfrac{k}{L}$ soi oe **M1** (Dep on 1st **M1**)for substituting $f = 93.7$ and $L = 3.2$ soi by 299.8 or 299.84
(b)	107 or 107.0 to 107.1 …	1FT	**FT** $\dfrac{\textit{their } k}{L}$ oe only
(c)	857 or 856.5 to 857.1 …	2FT	**FT** $\dfrac{\textit{their } k}{L}$ oe only **M1** for $0.35 = \dfrac{\textit{their } k}{L}$
3 (a) (i)	Quadrilateral drawn at (–1, –1), (–1, –2), (–3, –1), (–3, –3)	3	**M2** for 3 pts correct or **M1** for correct reflection of A in y-axis
(ii)	Reflection $y = -x$ oe	1 1	
(b) (i)	Quadrilateral drawn at (3, 1), (6, 1), (3, 3), (9, 3)	2	**B1** for any stretch with y-axis invariant or with stretch factor 3
(ii)	Stretch, y-axis oe invariant (stretch factor) $\dfrac{1}{3}$	2	**B1** for any 2 correct

Question	Answer	Mark	Part Marks
4 (a)	66 000 or 65 970 to 65 982	**4**	**M1** for $\frac{4}{3} \times \pi \times 15^3$ **M1** for $\pi \times 15^2 \times 40$ **M1** for $\pi \times 25^2 \times 12$
(b) (i)	16.4	**1**	
(ii)	120	**3**	**M2** for $15000 \div 5^3$ oe or **M1** for 5^3 or $(\frac{1}{5})^3$ seen
5 (a)	4 points plotted correctly	**2**	**B1** for 2 or 3 correct
(b)	Positive	**1**	Ignore comments on strength
(c) (i)	75	**1**	
(ii)	16.6	**1**	
(d) (i)	$0.168t + 3.96$	**2**	or $m = 0.1684$ to 0.1685, $c = 3.963$ to 3.964 **B1** for $n = mt + c$ with either m or c correct or **SC1** for $0.17t + 4$[.0]
(ii)	18	**1FT**	**FT** from *their* equation with $t = 85$, answer rounded or truncated to nearest whole number
6 (a)	$3n + 2$ oe final answer	**2**	**B1** for $3n + k$ or $kn + 2$ oe
(b)	–3, 4, 15, 30	**2**	**B1** for 2 or 3 correct in correct place or –6, –3, 4, 15
(c)	$2n - 3$ oe final answer	**3**	**M2** for $(2n - 3)(n + 2)$ or **SC1** for $(2n + a)(n + b)$ where $ab = -6$ or $a + 2b = 1$ OR **B1** for –1, 1, 3, 5 **B1** for answer $2n + k$ or $kn - 3$
(d)	No **and** e.g. 502 not a multiple of 5 oe nfww	**2**	Dep on $5n - 1$ **M1dep** for *their* $(3n + 2)$ + *their* $(2n - 3) = 501$ oe Dependent on (a) and (c) linear
7 (a)	19.9 or 19.89 to 19.90	**3**	**M2** for $36^2 - 30^2$ soi by 396 or **M1** for $AD^2 + 30^2 = 36^2$ oe
(b)	$30 \div \tan 68$ oe	**M2**	**M1** for $\tan 68 = \frac{30}{AC}$ oe
	12.12...	**A1**	
(c)	301 or 301.3 to 301.4 or 239 or 238.6 to 238.7	**3**	**B2** for 31.3 or 31.30 to 31.35 or **M1** for tan = 12.1 ÷ *their* (a) oe

Question	Answer	Mark	Part Marks
8 (a) (i)	Correct sketch 	2	**B1** RH branch through (0, 0) ,with asymptote $x = a$ (–ve a) **B1** for LH branch symmetrical, with asymptote $x = a$ (–ve a)
(ii)	–2 0	1 1	
(iii)	$x = -1$	1	
(b) (i)	Correct sketch 	2	**B1** for correct shape
(ii)	Same right hand branch	1	
(iii)	e.g. $\log(1 + 2x + x^2) = 2\log(1 + x)$ No log of a negative number	1 1	Independent
9 (a)	1 hour 20 minutes cao	3	**M1** for $65 \div 48.75$ **M1** for correctly converting *their* time in hours to hours and mins
(b)	140 or 140.4 to 140.5	5	**M1** for $632 + 65$ [km] soi by 697 **M1** for *their* $697 \div 119.5$ soi by 5.83... **M1** for subtracting *their* 1.33...(from (a)) **M1** for $632 \div$ (*their* 4.4993)
(c)	27.9	3	**M2** for $\dfrac{800+130}{120\times\dfrac{1000}{60\times60}}$ oe or **M1** for distance ÷ speed

Question	Answer	Mark	Part Marks
10 (a)	8.94 or 8.944... or $4\sqrt{5}$	3	**M2** for $8^2 + 4^2$ **M1** for 8 and 4 seen
(b)	Gradient of $AB = \frac{1}{2}$ oe	1	
	Gradient of perpendicular = –2 oe	1FT	
	$y = (their–2)x + c$	M1	
	midpoint (2, 1)	B1	May be on diagram
	Substitute (2, 1) to reach $c = 5$	A1	
	OR		
	$(x + 2)^2 + (y + 1)^2$ oe	B1	
	$(x – 6)^2 + (y – 3)^2$ oe	B1	
	equating above two expressions	M1	
	3 correct expansions	B1	
	correct completion with no errors or omissions	A1	
(c)	$\left(\frac{5}{3}, \frac{5}{3}\right)$ oe	2	**M1** for $x + 2x = 5$ oe
11 (a)	$9^2 = (3x – 1)^2 + (2x)^2 – 2(2x)(3x – 1)\cos 60$ oe	M1	
	$81 = 9x^2 – 6x + 1 + 4x^2 – 6x^2 + 2x$ oe	A2	or **B1** for $9x^2 – 3x – 3x + 1$
	$7x^2 – 4x – 80 = 0$	A1	Completion with no errors or omissions
(b) (i)	$\frac{-(-4) \pm \sqrt{(-4)^2 – 4 \times 7 \times (-80)}}{2 \times 7}$ oe	M1	or sketch of quadratic graph (any relevant one) with 1 positive root and 1 negative root
	$x = 3.68$ or 3.678... or –3.11 or – 3.107 to –3.106	B2	**B1** for either
(ii)	[AB =] 7.36 or 7.356 to 7.357	1FT	**FT** 2 × a positive root
	[BC =] 10[.0] or 10.03 to 10.04	1FT	**FT** 3 × a positive root – 1
(c)	31.9 or 32[.0] or 31.85 to 32[.00]	2FT	**M1** for $\frac{1}{2}$ × *their AB* × *their BC* sin 60 oe

Question	Answer	Mark	Part Marks
12 (a)	63.6	2	**M1** for midpoints (47.5, 52.5, 57.5, 62.5, 67.5, 72.5, 77.5) soi
(b)	Correct Curve	5	**B4** for 5 points correct and joined or for 6 points correct or **B3** for at least 3 correct points or **B2** for all correct cfs 5, 24, 58, 116, 162, 191, 200 seen or **B1** for at least 3 correct cfs or for increasing curve with 6 points plotted at upper bounds If 0 or 1 or 2 scored, **SC3** for **all** points correct but consistently translated to mid-interval or lower bound.
(c) (i)	63 to 64	1	Dependent on increasing curve
(ii)	8.5 to 10.5	2	**B1** for[l.qtile. =] 58.5 to 59.5 or [u.qtile. =] 68 to 69 Dependent on increasing curve
(d) (i)	$\frac{12 \text{ to } 16}{200}$ oe	1FT	**FT** (*their* 'read off' at 53)/200 dep on increasing cfs
(ii)	$\frac{72}{39800}$ oe	2	**M1** for $\frac{k}{200} \times \frac{k\text{-}1}{199}$ where k = 8, 9 or 10
13 (a) (i)	2.25 oe	2	**M1** for $1 = 2(5 - 2x)$ or $5 - 2x = \frac{1}{2}$ oe
(ii)	$-5 + 4x$ final answer	2	**B1** for $5 - 2(5 - 2x)$
(iii)	$\frac{5 - x}{2}$ oe final answer	2	**M1** for $2x = 5 - y$ or $x = 5 - 2y$ or $\frac{y}{2} = \frac{5}{2} - x$
	3	1	