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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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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

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
nfw	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part Marks
1 (a) (i)	16 000	3	M2 for $13600 \div 0.85$ 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 nfw	3	M2 for $\frac{\log\left(\frac{11500}{23000}\right)}{\log 0.92}$ 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 nfw or 8.3(1295..) nfw
2 (a)	$\frac{300}{L}$ oe	3	M1 for $f = \frac{k}{L}$ soi oe M1 (Dep on 1 st 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 $\frac{\text{their } k}{L}$ oe only
(c)	857 or 856.5 to 857.1 ...	2FT	FT $\frac{\text{their } k}{L}$ oe only M1 for $0.35 = \frac{\text{their } k}{L}$
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) $\frac{1}{3}$	2	B1 for any 2 correct

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

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 <i>their</i> 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 nfw	2	Dep on $5n - 1$ M1dep for <i>their</i> $(3n + 2) + \text{their } (2n - 3) = 501$ 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 12.12...	M2 A1	M1 for $\tan 68 = \frac{30}{AC}$ oe
(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 $\tan = 12.1 \div \text{their (a)}$ oe

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

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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 <i>their</i> 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 <i>their</i> $697 \div 119.5$ soi by 5.83... M1 for subtracting <i>their</i> 1.33...(from (a)) M1 for $632 \div$ (<i>their</i> 4.4993)
(c)	27.9	3	M2 for $\frac{800 + 130}{120 \times \frac{1000}{60 \times 60}}$ oe or M1 for distance \div speed

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

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

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

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 (<i>their</i> 'read off' at 53)/200 dep on increasing cfs
(ii)	$\frac{72}{39800}$ oe	2	M1 for $\frac{k}{200} \times \frac{k-1}{199}$ 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 $\frac{y}{2} = \frac{5}{2} - x$
	$\frac{2}{3}$	1	