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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **October/November 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

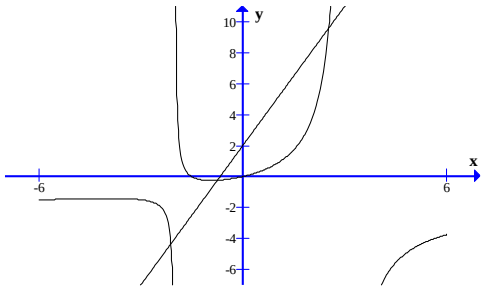
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Question	Answer	Marks	Partial Marks
1(a)(i)	18	**1**	
1(a)(ii)	10	**1**	
1(a)(iii)	12.5 cao	**1**	
1(a)(iv)	13.25	**1**	
1(a)(v)	6.5 nfww	**2**	**B1** for 17 or 10.5 seen
1(b)	It is the largest oe	**1**	
2(a)	3167.94	**3**	**M2** for $3000 \times 1.025 \times 1.015^2$ oe or **M1** for 3000×1.025 [$\times k^n$] soi by 3075 or for 3000×0.025 soi by 75
2(b)	3144	**3**	**M2** for $3000 \times 0.016 \times 3 + 3000$ oe or **M1** for $3000 \times 0.016 \times 3$ soi by 144 or for $3000 \times 0.016 \times n + 3000$, $n > 1$
2(c)	$\log\left(\frac{3500}{3000 \times 1.025}\right) \div \log 1.015$ oe	**M2**	or **M1** for $3000 \times 1.025 \times 1.015^n = 3500$ implied by at least two correct attempts with $n > 2$, n integer
	$3000 \times 0.016 \times n + 3000 = 3500$ oe or $3000 \times 0.016 \times n = 500$ oe	**M1**	
	9.7[0] or 9.695... and 10.4 or 10.41 to 10.42 oe	**A1**	**A1** depends on corresponding years
3(a)	4, 10, 18, 28	**2**	**B1** for any 2 in correct position or 0, 4, 10, 18
3(b)(i)	13, 15	**1**	
3(b)(ii)	$2n + 3$ oe	**2**	**B1** for $2n$ [$+ c$], or $kn + 3$, $k \neq 0$
3(c)	$n^2 + 7n + 6$ or $(n + 6)(n + 1)$	**2**	**M1** for 2 *their* $(2n + 3) + n^2 + 3n$ or 2nd differences = 2, 2, [2] and quadratic or correct unsimplified
4(a)	6 points correctly plotted	**2**	± small square, **B1** for 4 or 5 points correct.
4(b)	Positive	**1**	
4(c)(i)	$10.6x + 5.7$[0]	**2**	or $a = 10.57...$, $b = 5.702...$ **B1** for $y = ax + b$ with either a or b correct. **SC1** for $11x + 5.7$
4(c)(ii)	29[.0] or 28.95 to 29.02	**1**	Strict **FT** (*their* 10.6×2.2) + *their* 5.7
4(c)(iii)	[Too far] outside range of data oe	**1**	

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Question	Answer	Marks	Partial Marks
5(a)	$\frac{45}{360} \times 2\pi \times 22.5 = 2\pi r$ or $\frac{45}{360} \times \pi \times 22.5^2 = \pi \times r \times 22.5$	**M2**	or **M1** for $\frac{45}{360} \times 2\pi \times 22.5$ or $\frac{45}{360} \times \pi \times 22.5^2$
	2.812 to 2.813	**A1**	
5(b)	241 or 240.7 to 241.0...	**5**	**M3** for $\frac{45}{360} \times \pi\,(32.5^2 - 22.5^2)$ oe or **M2** for $\frac{45}{360} \times \pi \times 32.5^2$ or $\frac{45}{360} \times \pi \times 22.5^2$ and **M1** for $\pi \times 2.81^2$
5(c)	963 or 964 or 962.8 to 963.6	**2**	**FT** *their* (b) × 4 **B1** for length scale factor = 2, $\sqrt[3]{8}$, $\frac{1}{2}$ soi, or area factor = 2^2 oe
6(a)	Translation $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$	**2**	**B1** for each
6(b)	Triangle at (2, 6), (3, 6), (2, 12)	**2**	**B1** for any stretch with *x*-axis invariant or stretch with scale factor 3 and $y = k$ invariant or stretch with *y*-axis invariant, s.f. = 3
6(c)	90° [anti-clockwise] or 270° clockwise Centre (a, $a + 1$) $x = a + 3$ OR 90° clockwise or 270° [anticlockwise] Centre ($b + 5$, b) $y = b + 3$	**3**	**B1** for each Dep on 90° anti-clockwise or 270° clockwise Dep on previous mark If 0 scored, **SC1** for centre (a, $a + 1$) and $x = a + 3$ OR **B1** for each Dep on 90° clockwise or 270° anti-clockwise Dep on previous mark If 0 scored, **SC1** for centre ($b + 5$, b) and $y = b + 3$
7(a)	192.5	**3**	**B1** for 2.75 oe **M1** for 70 × *their* 2.75

Question	Answer	Marks	Partial Marks
7(b)(i)	69.4 or 69.36 to 69.41	**4**	**M1** for 180 ÷ 85 **A1** for 2.12 or 2.117... or $\frac{36}{17}$ oe **M1dep** for *their* total distance ÷ *their* total time (dependent on first M1)
7(b)(ii)	04 12[...]	**2**	**M1** for correctly converting *their* total time to hours and minutes. or **B1** for 02 05 seen or total time = 5h 22min or 322 min
8(a)	300°	**3**	**B1** for $ABN' = 150$ or $ABS' = 30$ **B1** for $N'BC = 120$ or $CBS' = 60$ OR **B1** for $ACB = 35$ **B1** for $N'CB = 60$
8(b)	$\frac{60}{\cos 55}$ oe	**M2**	or **M1** for $\cos 55 = \frac{60}{AC}$ oe
	104.60 to 104.62	**A1**	
8(c)	9780 or 9776 to 9782. ...	**6**	**B1** for angle $ADC = 41$ **M2** for $[AD=]\frac{104.6\sin 76}{\sin(their\ 41)}$ (154.7...) or **M1** for $\frac{104.6}{\sin(their\ 41)} = \frac{AD}{\sin 76}$ **M1** for $\frac{1}{2} \times 60 \times 104.6 \times \sin 55$ oe **M1** for $\frac{1}{2} \times 104.6 \times$ *their* $AD \times \sin 63$ oe
8(d)	93.2 or 93.16 to 93.23	**2**	**M1** for $104.6 \times \sin 63$ oe
9(a)	$\frac{3}{8}, \frac{5}{8}$ correctly placed $\frac{2}{7}, \frac{5}{7}$ correctly placed $\frac{6}{9}, \frac{3}{9}$ correctly placed	**3**	**B1** for each pair
9(b)(i)	$\frac{6}{56}$ oe	**2**	**M1** for *their* $\frac{3}{8} \times$ *their* $\frac{2}{7}$
9(b)(ii)	$\frac{115}{168}$ oe	**3**	**M2** for *their* $\frac{3}{8} \times$ *their* $\frac{5}{7}$ + *their* $\frac{5}{8}$ $\times$ *their* $\frac{6}{9}$ oe or **M1** for 1 of above products

Question	Answer	Marks	Partial Marks
10(a)	$8 - 3x$ final answer	**1**	
10(b)(i)	$x^2 + (\textit{their}\ (8 - 3x))^2 = 25$	**M1**	
	$64 - 24x - 24x + 9x^2$	**B1**	or *their* $(8 - 3x)^2$ expanded correctly
	Completion to $10x^2 - 48x + 39 = 0$	**A1**	
10(b)(ii)	(1.04 or 1.036... , 4.88 to 4.89...) with working (3.76 or 3.763 to 3.764 ,–3.29.. to –3.28) with working	**5**	**M1** for $\frac{48 \pm \sqrt{(-48)^2 - 4(10)(39)}}{2\times 10}$ or sketch of parabola with both zeros > 0 or sketch of circle centre *O* with straight line **B1** for each x co-ordinate **B1** for each y co-ordinate or **B1** , **B1** for correct pairs reversed
11(a)	Correct sketch 	**3**	**B1** for each branch
11(b)	(–0.93[0], –0.252) or (–0.9303..., 0.2521...)	**2**	**B1** for each co-ordinate
11(c)	$x = -2$ final answer $x = 3$ final answer	**2**	**B1** for each
11(d)(i)	–2.12 or –2.117... –0.747 or –0.7465... 2.53 or 2.530 to 2.531	**3**	**B1** for each
11(d)(ii)	$x < -2.12$ $-2 < x < -0.747$ $2.53 < x < 3$	**3**	**FT B1** for each only if three answers in (i) and asymptotes used
12(a)	–2	**2**	**M1** for $-3x = 11 - 5$ oe
12(b)	$\frac{5-x}{3}$ oe final answer	**2**	**M1** for $3x = 5 - y$ or $x = 5 - 3y$ or $y - 5 = -3x$ or $\frac{y}{5} = \frac{5}{3} - x$ or better
12(c)	$\frac{5}{3}$ oe $\quad -\frac{3}{2}$ oe final answers	**2**	**B1** for each

Question	Answer	Marks	Partial Marks
12(d)(i)	x	**1**	
12(d)(ii)	$11x - 7$	**3**	**M2** for $5 - 3(5 - 3x) + 2x + 3$ or **M1** for $5 - 3(5 - 3x)$
12(d)(iii)	$\frac{26-8x}{(5-3x)(2x+3)}$ final answer	**3**	**M1** for $2(2x+3)+4(5-3x)$ oe **M1** for common denominator $(5 - 3x)(2x + 3)$
13(a)(i)	$\mathbf{c} - \mathbf{a}$ oe	**1**	
13(a)(ii)	$\frac{2}{3}\mathbf{a} + \frac{1}{3}\mathbf{c}$ or $\frac{1}{3}(2\mathbf{a} + \mathbf{c})$	**2**	**B1** for correct unsimplified or correct route e.g. $\mathbf{c} + \frac{2}{3}\overrightarrow{CA}$ or $\mathbf{a} + \frac{1}{3}$ *their* (i)
13(a)(iii)	$2\mathbf{a}$	**2**	**B1** for correct unsimplified or correct route e.g. $-\mathbf{c} + 3 \times$ *their* (ii)
13(b)	Collinear oe	**1**	

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