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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

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

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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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

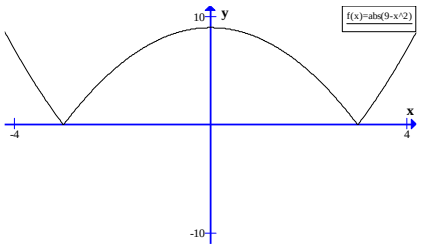
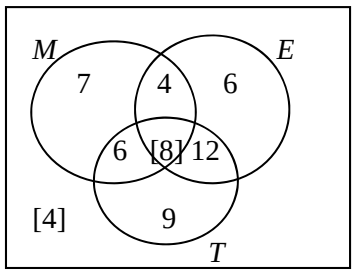
awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

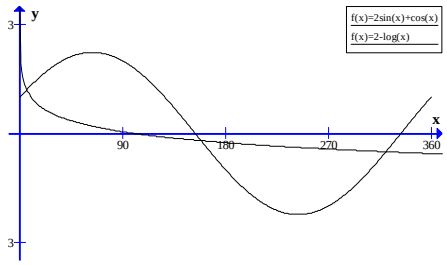
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Question	Answer	Marks	Partial Marks
1(a)(i)	24 $4n$ final answer	**2**	**B1** for each
1(a)(ii)	–11 $–2n + 1$ oe final answer	**3**	**B1** for –11 **M1** for $kn + 1$ (where $k < 0$) or $– 2n + k$
1(a)(iii)	108 $3n^2$ oe final answer	**3**	**B1** for 108 **M1** for kn^2 [+ q]
1(a)(iv)	216 n^3 oe final answer	**2**	**B1** for each
1(b)	337 $n^3 + 3n^2 + 2n + 1$ oe final answer	**3**	**B1** for 337 **M1** for adding *their n*th terms or 3rd differences = 6 and a cubic with numerical coefficients for the answer
2(a)	31.1	**2**	**M1** for evidence of at least 3 correct midpoints
2(b)(i)	[7], 20, 40, 72, 100	**1**	
2(b)(ii)	Correct Graph	**3**	**B1** for plotting *their* points at upper group limit (but points must be increasing vertically) **B1** for 4 or 5 correct **FT** vertical plots (must be increasing)
2(c)(i)	32.5 to 34.5	**1**	**FT** *their* graph, dependent on increasing curve
2(c)(ii)	16.5 to 20	**2**	**FT** *their* graph, dependent on increasing curve **B1** for UQ = 40.5 to 42 or LQ = 22 to 24 or **M1** for *their* UQ – *their* LQ
2(c)(iii)	3 to 4	**3**	**FT** *their* graph, dependent on increasing curve **M2** for *their* 55 th percentile (34 to 36) and *their* 45 th percentile (31 to 33) or **M1** for *their* 45th percentile (31 to 33) or *their* 55th percentile (34 to 36) or **SC3** for e.g. 32 to 35
3(a)	49.8 or 49.84 to 49.85	**3**	**M2** for $\frac{30}{\sin 37}$ oe or **M1** for $\sin 37 = \frac{30}{AC}$ oe
3(b)	39.7 or 39.8 or 39.74 to 39.81…	**3**	**M2** for $\frac{30}{\tan 37}$ or *their* (a) × cos 37 oe or **M1** for $\tan 37 = \frac{30}{BC}$ or $\cos 37 = \frac{BC}{\text{their (a)}}$ oe

Question	Answer	Marks	Partial Marks
3(c)	21.7 or 21.8 or 21.67 to 21.81	**3**	**M2** for $\frac{30}{\tan 26} - \textit{their}(\text{b})$ or $\frac{(\textit{their}(\text{a})) \times \sin(180-(180-37)-26)}{\sin 26}$ oe or **M1** for $\frac{30}{\tan 26}$ or $\frac{\textit{their}(\text{a})}{\sin 26} = \frac{CD}{\sin(180-(180-37)-26)}$ oe
3(d)	325 or 326 or 327 or 325[.0] to 327.2	**2**	**M1** for $\frac{1}{2} \times$ *their* (c) × 30 oe
4(a)	Correct triangle (2, 1) (3, 1) (2, 4)	**2**	**B1** for translation $\begin{pmatrix} k \\ -4 \end{pmatrix}$ or $\begin{pmatrix} 0 \\ k \end{pmatrix}$
4(b)	Correct triangle (–5, 2) (–5, 3) (–8, 2)	**2**	**B1** for correct rotation, incorrect centre or for rotation 90° clockwise, correct centre
4(c)	Rotation [Centre] (0, 0) 90° clockwise oe	**2**	**B1** for each
4(d)	Correct triangle (–5, –2) (–5, –3) (–8, –2)	**3**	**B1** for $y = -x$ soi **M1** for correct shape, incorrect location
4(e)	Reflection *x*-axis oe	**2**	**B1** for each
5(a)	[Angle between] tangent [and] radius / diameter [=90] oe	**1**	
5(b)(i)	134	**2**	**M1** for 360 – 90 – 90 – 46 oe
5(b)(ii)	23	**2**	**M1** for (180 – *their* (i)) ÷ 2 oe
5(b)(iii)	67	**2**	**FT** (*their* (i)) ÷ 2 **M1** for (*their* (i)) ÷ 2 oe
5(b)(iv)	113	**2**	**FT** 180 – *their* (iii) or (360 – *their* (i)) ÷ 2 **M1** for 180 – *their* (iii) or (360 – *their* (i)) ÷ 2 oe
5(c)	44	**3**	**M2** for 180 – 67 – 23 – 23 – 23 oe or 360 – 226 – 67 – 23 oe or **B1** for angle *OBC* = 23 or 226 seen

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Question	Answer	Marks	Partial Marks
6(a)	8	**3**	**M1** for $y = \frac{k}{x^2}$ oe **A1** for $k = 128$ OR **M2** for $32 \div \left(\frac{4}{2}\right)^2$ oe or **M1** for $\frac{y}{32} = \frac{\frac{1}{4^2}}{\frac{1}{2^2}}$ oe
6(b)	[±] $\frac{1}{2}$ oe	**2**	**M1** for $x^2 = \frac{their\ k}{512}$ oe or $2 \times \sqrt{\frac{32}{512}}$ oe
6(c)	[x = ±] $\sqrt{\frac{128}{y}}$ oe final answer	**3**	**M1** for multiplication by x^2 **M1** for division by y or for square root
7(a)	Correct Graph 	**4**	**B1** for maximum point on or close to y-axis **B1** for correct shape between *their* –3 and 3 **B1** for mod graph
7(b)	[x =] ±4, ± $\sqrt{2}$ or ± 1.41 or ± 1.414...	**2**	**B1** for any 2 correct answers
7(c)	$k > 9$ $k = 0$	**2**	**B1** for each
8(a)	Correct values inside circles 	**3**	**B2** for 4 or 5 regions correct **B1** for 2 or 3 regions correct
8(b)(i)	17	**1**	**FT** *their* diagram
8(b)(ii)	11	**1**	**FT** *their* diagram

Question	Answer	Marks	Partial Marks
8(c)	$\frac{4}{56}$ oe	**2**	**FT** *their* 4 **M1** for $\frac{their\,4}{k}$ ($k >$ *their* 4) or $\frac{p}{56}$ ($p < 56$)
8(d)	$\frac{1190}{3080}$ oe	**2**	**M1** for $\frac{35}{56} \times \frac{34}{55}$
8(e)	$\frac{6}{25}$ oe	**2**	**FT** *their* 6 **M1** for $\frac{their\,6}{k}$ ($k >$ *their* 6) or $\frac{p}{25}$ ($p < 25$)
8(f)	$\frac{12}{870}$ oe	**3**	**M2** for $\frac{their\,4}{30} \times \frac{(their\,4)-1}{29}$ (*their* 4 < 30) or **M1** for $\frac{a}{30} \times \frac{a-1}{29}$ (*their a* < 30)
9(a)	$[\cos x =] \frac{8^2 + 6^2 - 2^2}{2 \times 6 \times 8}$ oe	**M2**	**M1** for $12^2 = 8^2 + 6^2 - 2 \times 8 \times 6 \cos[...]$
	117.3 or 117.2 to 117.3	**B1**	
9(b)	$[\sin =] \frac{6 \times \sin(their(a))}{12}$ oe	**M2**	**M1** for $\frac{6}{\sin A} = \frac{12}{\sin(their(a))}$ oe
	26.4 or 26.5 or 26.37 to 26.46	**B1**	
10(a)	Correct Graph 	**3**	**M1** for sine graph with one max and one min **A1** for x-intercepts at 150 and 330 (approx.) **A1** for positive y-intercept
10(b)	Correct Graph with second intersection with other graph (if correct) below x-axis	**2**	**M1** for correct shape
10(c)	6.18 or 6.175... 159 or 158.5 to 158.6 320 or 320.3 to 320.4	**3**	**B1** for each
11(a)(i)	275	**1**	
11(a)(ii)	2.5 oe	**2**	**M1** for 275 ÷ 110

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Question	Answer	Marks	Partial Marks
11(b)	09 00 oe	**3**	**B2** for 1 h 42 mins or 102 mins soi or **M1** for 170 ÷ 100 oe If 0 scored, **SC1** for correct conversion of *their* decimal time into hours and mins
11(c)	24.6 or 24.63...	**3**	**M2** for $\frac{215}{12.5} \times 1.432$ or **M1** for $\frac{215}{12.5}$ or 215×1.432 or $\frac{1.432}{12.5}$ soi
11(d)(i)	$\frac{325}{90+x} - \frac{110}{30+2x} = \frac{3}{2}$ oe	**M2**	or **M1** for $\frac{325}{90+x}$ or $\frac{110}{30+2x}$
	$650(30 + 2x) – 220(90 + x)$ $= 3(90 + x)(30 + 2x)$ oe	**M1**	**Dependent on first equation containing the three terms.** Correctly eliminating fractions
	Correct completion to $x^2 – 75x + 1400$ with no errors or omissions	**A2**	**B1** for $2700 + 180x + 30x + 2x^2$ soi
11(d)(ii)	125 and 130	**3**	**B2** for one or for 35 and 40 or **B1** for 35 or 40 or **M1** for $\frac{-(-75) \pm \sqrt{(-75)^2 - (4)(1)(1400)}}{2 \times 1}$ or sketch of parabola with two positive zeros or $(x – 35)(x – 40)$

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