CAMBRIDGE INTERNATIONAL MATHEMATICS 0607/31

Paper 3 (Core) **May/June 2017**

MARK SCHEME

Maximum Mark: 96

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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This document consists of **5** printed pages.

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

Question	Answer	Marks	Part Marks
1(a)	Accept any two from: whole [number], prime [number], odd, integer, real [number], natural [number], rational [number], positive [number]	**2**	**B1** for one correct
1(b)(i)	Any multiple of 7	**1**	
1(b)(ii)	$\dfrac{7}{100}$	**1**	
1(b)(iii)	399	**1**	
1(c)(i)	0.14	**2**	**B1** for 0.143 or 0.1428 to 0.1429
1(c)(ii)	2.65	**2**	**B1** for 2.645 to 2.646
1(c)(iii)	8.24×10^5 or $8.235\ldots \times 10^5$	**2**	**B1** for 823543 soi
2(a)	100	**1**	
2(b)	27	**1**	
2(c)	$\dfrac{9}{20}$	**2**	**FT** $\dfrac{45}{their\,(\mathrm{a})}$ correctly cancelled **B1FT** for $\dfrac{45}{100}$ or $\dfrac{45}{their\,(\mathrm{a})}$
2(d)	Bars with heights at 45 and 18	**2**	**B1** for one bar correct height
3(a)(i)	94.5[0]	**1**	
3(a)(ii)	90	**1**	
3(a)(iii)	The Valley, 4.5[0]	**1**	**FT** *their* (a)(i) and (a)(ii)
3(b)	14	**3**	**M1** for 200 ÷ 13.50 soi **A1** for 14.8…
4(a)	29	**1**	
4(b)(i)	Equilateral	**1**	
4(b)(ii)	60	**2**	**M1** for 180÷3
4(b)(iii)	3	**1**	
4(c)	78	**2**	**M1** for (180 – 24) ÷ 2 soi
5(a)	x^{11}	**1**	
5(b)	x^{8}	**1**	
5(c)	x^{18}	**1**	

Question	Answer	Marks	Part Marks
6(a)(i)	Correct diagram	**1**	
6(a)(ii)	12	**1**	
6(b)	8, 16, 32	**2**	**B1** for two values
	Multiply by 2 oe	**1**	
	7, 11, 16	**2**	**B1** for two values
	+1, +2, +3 oe	**1**	
7(a)	14	**4**	**M3** for $27.5 \times 15 \times 4 - 16 \times 16 \times 6.5$ oe or **M1** for $27.5 \times 15 \times 4$ or $16 \times 16 \times 6.5$ oe **A1** for $A = 1650$ **A1** for $B = 1664$
7(b)	Area of 6 faces of B	**M2**	**M1** for area of 3 faces of B
	$B = 928$	**A1**	
	$\dfrac{their\ B}{1165}$ [×100]	**M1**	
	79.6 to 79.7	**A1**	
8(a)	7	**2**	**M1** for $5 \times 3 - 4 \times 2$ or **B1** for 15 or −8 seen
8(b)	$3x(x - 3)$	**2**	**B1** for $3(x^2 - 3x)$ or $x(3x - 9)$
8(c)(i)	2	**2**	**M1** for $4x = 13 - 5$ oe
8(c)(ii)	9	**2**	**M1** for $3x - 12 = 15$ or $x - 4 = 5$
8(d)	$\dfrac{F - B}{2}$ oe final answer	**2**	**M1** for $F - B = 2A$ or $\dfrac{F}{2} = A + \dfrac{B}{2}$ seen If 0 scored **SC1** for answer $\dfrac{F}{2} - B$ or $F - B \div 2$
9(a)	Rotation 90 [anti-clockwise] or 270 clockwise [About] (0, 0) or Origin	**3**	**B1** for each
9(b)	Correct translation	**2**	**M1** for translation $\begin{pmatrix} k \\ 1 \end{pmatrix}$ or $\begin{pmatrix} 4 \\ k \end{pmatrix}$
9(c)	Correct reflection	**2**	**M1** for correct reflection in any vertical line

Question	Answer	Marks	Part Marks
10(a)	4 points correctly plotted	2	**B1** for 2 or 3 points correctly plotted
10(b)	Negative	1	
10(c)(i)	6	1	
10(c)(ii)	5.5	1	
10(d)	Ruled line of best fit through *their* mean point and within tolerance	2	**M1** for ruled line within tolerance not through *their* mean point or for ruled line with negative gradient through *their* mean point
10(e)	9	1	**FT** *their* line with negative gradient
10(f)(i)	21 to 40	1	
10(f)(ii)	Largest 100	1	
	Smallest 61	1	
11(a)	14	2	**M1** for $7 \div 30$ or $30 \div 60$
11(b)	46	2	**M1** for 50×0.08 oe or for 0.92 oe seen
11(c)	176	2	**M1** for $208 \div (11 + 2)$ soi by 16
12(a)	38.3 or 38.29 to 38.30	4	**B1** for 139 **B2** for 100.7… or **M1** for $85^2 + 54^2$
12(b)	32.4 or 32.42 to 32.43	2	**M1** for $\tan [...] = \dfrac{54}{85}$ oe **FT** *their AB* if using sine or cosine
13(a)	Correct sketch	2	**B1** for correct shape, wrong position
13(b)	Correct sketch	2	**B1** for correct shape but touching axes and/or with branches connected
13(c)	1.83 or 1.826 to 1.827	1	
	–0.442 or –0.4415 to –0.4419	1	If 0 scored **SC1** for 1.8 and 0.44