Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **May/June 2018**

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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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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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.

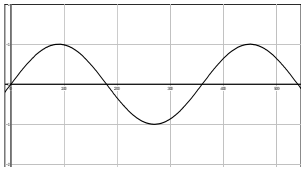
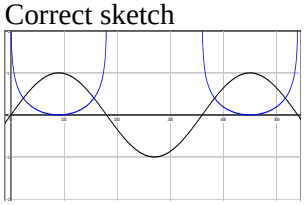
Abbreviations

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)	Translation $\begin{pmatrix}1\\7\end{pmatrix}$	**2**	**B1** for each
1(a)(ii)	Reflection $x = -\frac{1}{2}$ oe	**2**	**B1** for each
1(b)	Triangle drawn at (3, 2), (3, 4), (–3, 2)	**2**	**B1** for enlargement factor 2 with wrong centre, or correct centre with wrong positive factor (not 1)
1(c)	Triangle drawn at (2, 1), (8, 1), (8, 2)	**2**	**B1** for stretch factor 2 with *x*-axis invariant. or stretch factor 2 translated horizontally
2(a)	$\frac{8000}{5+7+8} \times 8$ [= 3200]	**M2**	**M1** for 8000 ÷ (5 + 7 + 8) If 0 scored **SC1** for $\frac{3200}{8} \times 20 = 8000$ oe
2(b)	15.4 or 15.38…	**3**	**M2** for $\frac{65-55}{65}$[×100] or $\frac{55}{65} \times 100$ or $1 - \frac{55}{65}$ or **M1** for 65 − 55 or $\frac{55}{65}$
2(c)	500	**2**	**M1** for $\frac{2500 \times 2.5 \times 8}{100}$ oe
2(d)	501.42	**3**	**M2** for 2400×1.024^8 oe (2901 or 2901.4[0] or 2901.42…) or **M1** for 2400×1.024^n oe where $n > 1$
2(e)	84	**3**	**M2** for $79.80 \div \left(1 - \frac{5}{100}\right)$ oe or **M1** for recognising 79.80 is 95%
3(a)	$2 \times 3 - 7 = -1$ oe	**1**	Correct substitution
3(b)(i)	$\left(-\frac{1}{2}, 0\right)$ oe	**1**	
3(b)(ii)	(0, 4)	**1**	
3(c)	[y =] $3x - 1$	**3**	**M1** for gradient = $\frac{11-2}{4-1}$ oe or better **M1** for substituting (1, 2) or (4, 11) into $y = (\textit{their } m)x + c$

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Question	Answer	Marks	Partial Marks
4(a)(i)	1 | 7 8 9 9 2 | 0 1 1 1 1 2 2 3 4 5 e.g. 2|3 = 23	**3**	**B1**for each row **B1** for key
4(a)(ii)	21 19	**2**	**B1** for each
4(a)(iii)	102.8 to 102.9	**2**	**M1** for $\frac{4}{14}$ oe or $\frac{360}{14}$ oe
4(b)(i)	2.4	**1**	
4(b)(ii)	0.9	**2**	**B1** for 3 or 2.1 seen
4(b)(iii)	20	**2**	**M1** for 180 seen
4(c)(i)	253.125 or 253.13 or 253.1 or 253	**2**	**M1** for evidence of at least two mid-values 150, 225, 325 soi by e.g. 50625
4(c)(ii)	Correct histogram	**4**	**B1** for bars with correct widths **B1** for first bar with height 0.25 **B1** for second bar with height 2 **B1** for third bar with height 0.5 If 0 scored **SC1** for three correct frequency densities seen
5(a)(i)	Correct sketch 	**2**	**B1** for sine graph with different amplitude and/or period but must go through (0, 0) or for correct sine graph but only one cycle
5(a)(ii)	$-1 \leqslant f(x) \leqslant 1$	**1**	
5(b)(i)	Correct sketch 	**2**	i.e. Correct shape with 2 branches above x-axis and gap of at least 120 between the branches and only slightly crossing either axis. **B1** for 2 branches above x-axis but gap less than 120 between the branches and only slightly crossing either axis or one branch correct
5(b)(ii)	logarithms of negative numbers do not exist oe	**1**	
5(b)(iii)	(90, 0), (450, 0)	**2**	**B1** for each
5(b)(iv)	$x = 0$, $x = 180$, $x = 360$, $x = 540$	**2**	**B1** for 2 or 3 correct

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Question	Answer	Marks	Partial Marks
5(c)(i)	23.5 or 23.51 to 23.52	**1**	
5(c)(ii)	$23.5 < x < 156.5$ $383.5 < x < 516.5$	**2**	**B1** for each Allow 23.51 to 23.52, 156.48 to 156.49 Allow 383.51 to 383.52, 516.48 to 516.49
5(c)(iii)	Any integer less than – 1	**1**	
6(a)(i)(a)	$2\pi r = 12$ oe	**M1**	
	1.9096 to 1.9099	**A1**	
6(a)(i)(b)	458 or 457.9 to 458.5	**2**	**M1** for $\pi \times 1.91[0]^2 \times 40$
6(a)(ii)	1070	**4**	**B3** for volume of other cylinder 1530 or 1527 to 1529. … or **M2** for $\pi \times \left(\frac{40}{2\pi}\right)^2 \times 12$ or **M1** for $40 \div (2\pi)$ oe
6(b)	40	**4**	**M3** for $\sqrt[3]{\frac{4.8 \times 100^3}{75}}$ oe or **M1** for $\sqrt[3]{\frac{\text{figs } 48}{\text{figs } 75}}$ oe or $\sqrt[3]{\frac{\text{figs } 75}{\text{figs } 48}}$ oe **and M1** for 4.8×100^3 or $75 \div 100^3$ oe
7(a)	$\frac{6}{30}$ oe	**2**	**M1** for $\frac{3}{6} \times \frac{2}{5}$ oe
7(b)	$\frac{12}{30}$ oe	**3**	**M2** for $\frac{2}{6} \times \frac{3}{5} \times 2$ oe or **M1** for $\frac{2}{6} \times \frac{3}{5}$ oe
7(c)	$\frac{28}{30}$ oe	**2**	**M1** for $1 - \frac{2}{6} \times \frac{1}{5}$ oe
8(a)	16 000	**2**	**M1** for $12\,960 \div \left(1 - \frac{10}{100}\right)^2$ oe or **B1** for 14400

Question	Answer	Marks	Partial Marks
8(b)	7 nfww	**3**	**B2** for 6.58 or 6.578 to 6.579 or **M2** for $\frac{\log\left(\frac{6480}{12960}\right)}{\log 0.9}$ oe or appropriate sketch or at least two trials with $n > 3$ or **M1** for $12960 \times \left(1-\frac{10}{100}\right)^n = 6480$ oe if 0 scored, **SC1** for answer 9 nfww, coming from 16000
9(a)	12.2 or 12.21 to 12.22	**2**	**M1** for $\sin 70 = \frac{[\ ]}{13}$ oe
9(b)	15.5 or 15.49…	**2**	**M1** for $\tan 50 = \frac{BD}{13}$ oe
9(c)	5.32 or 5.316 to 5.319…	**4**	**B1** for [angle *DBC* =] 20 **M1** for $(\textit{their}BD)^2 + 15^2 - 2 \times \textit{their } BD \times 15\cos(\textit{their } DBC)$ **A1** for 28.26 to 28.30…
9(d)	art 195	**3**	**M2** two of $0.5 \times 13 \times 13 \times \sin 40$ oe $0.5 \times 13 \times \textit{their } BD$ oe $0.5 \times 15 \times \textit{their } BD \times \sin(\textit{their } 20)$ or **M1** for one of above
10(a)	7.64 or 7.636…	**3**	**M2** for $\left(\frac{4 \times \frac{30}{60} + 5}{\frac{30}{60} + \frac{25}{60}}\right)$ oe or **M1** for $4 \times \frac{30}{60} + 5$ or $\frac{30}{[60]} + \frac{25}{[60]}$
10(b)(i)	$\frac{10x + 60y}{10 + z}$ or $\frac{10(x + 6y)}{10 + z}$	**3**	**M2** for $\left(\frac{x \times \frac{10}{60} + y}{\frac{10}{60} + \frac{z}{60}}\right)$ oe or **M1** for total distance = $x \times \frac{10}{60} + y$ or total time = $\frac{10}{[60]} + \frac{z}{[60]}$
10(b)(ii)	5	**2**	**M1** for correct substitution of $x = 3$, $z = 20$ and average speed = 11 in *their* formula which must contain x, y and z. or **B1** for 5.5 oe or 330 seen

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Question	Answer	Marks	Partial Marks
10(c)(i)	$\frac{3t}{60} + \frac{7(t+10)}{60}$ oe	**M1**	
	$\frac{t}{[60]} + \frac{t+10}{[60]}$	**M1**	The two **M1**s may be seen together in a correct fraction
	Correct simplification to $\frac{5t+35}{t+5}$ seen	**A1**	dep on M1M1 At least one line of working and no errors
10(c) (ii)	15	**2**	**M1** for $(5t + 35) = \left(5\frac{1}{2}\right)(t + 5)$ oe or better
11(a)	5	**1**	
11(b)	0.1oe , 1, 10, 100	**2**	**B1** for 3 correct or all correct seen and spoilt.
11(c)	6.5 oe	**2**	**M1** for $2x – 1 = 12$
11(d)	$2x – 2$ or $2(x – 1)$	**3**	**B2** for correct unsimplified answer OR **M1** for substituting $x – 2$ for x **M1** for adding 3 to a function in x oe OR **M1** for $y = 2x + c$ ($c \neq – 1$) leading to answer with gradient 2 **M1** for substituting coords of valid point into $y = 2x + c$
11(e)	$\log x$	**2**	**M1** for $\log y = x$ or $x = 10^y$
11(f)	23, 113	**3**	**B2** for 23 or **B1** for [g(x) =] 45 soi