Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/63**

Paper 6 (Extended) **October/November 2019**

MARK SCHEME

Maximum Mark: 40

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.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Partial Marks</th></tr>
<tr><td>A</td><td colspan="3">INVESTIGATION REMAINDERS</td></tr>
<tr><td>1(a)</td><td>3</td><td>1</td><td></td></tr>
<tr><td>1(b)</td><td>5</td><td>1</td><td></td></tr>
<tr><td>2</td><td>4000 – (210 × 19)
or 4000 ÷ 19 with 210 R 10
or 0.5263… × 19 = …… rounds to 10
or 4000 – 10 = 3990, 3990 ÷ 19 = 210</td><td>1</td><td></td></tr>
<tr><td>3</td><td>20 divided by at least 5 of the 6 factors of 20 giving the answer and R = 0 for each case</td><td>1</td><td></td></tr>
<tr><td>4</td><td>[Largest] 99 [Smallest] 0</td><td>1</td><td></td></tr>
<tr><td>5(a)</td><td>20 correct entries
<table>
<tr><td colspan="2"></td><td colspan="6">b</td></tr>
<tr><td colspan="2"></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td rowspan="6">a</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>2</td><td>0</td><td>0</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>0</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>1</td><td>0</td><td>4</td><td>4</td></tr>
<tr><td>5</td><td>0</td><td>1</td><td>2</td><td>1</td><td>0</td><td>5</td></tr>
<tr><td>6</td><td>0</td><td>0</td><td>0</td><td>2</td><td>1</td><td>0</td></tr>
</table></td><td>1</td><td></td></tr>
<tr><td>5(b)</td><td>A correct counter example, using numbers 1 to 6, showing sum of two remainders</td><td>1</td><td></td></tr>
<tr><td>5(c)</td><td>[The] remainder [is] less than 100 oe</td><td>1</td><td></td></tr>
<tr><td>6(a)(i)</td><td>[a =] = 2
[b =] = 3
R[16 ÷ 5] = 1 oe
R[6 ÷ 5] = 1 oe</td><td>2</td><td>B1 for 2 statements correct</td></tr>
<tr><td>6(a)(ii)</td><td>x = y and a = b</td><td>1</td><td></td></tr>
<tr><td>6(a)(iii)</td><td>R[76 ÷ 7] = 6
and
R[6^2 ÷ 7] = 1</td><td>1</td><td></td></tr>
</table>

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Question	Answer	Marks	Partial Marks
6(b)(i)	R[$7919^{16} \div 13$] [=] R[$9^2 \div 13$] [=] R[$81 \div 13$] [=] 3	**2**	**B1** for [$9^2 \div 13$]
6(b)(ii)	7	**2**	**M1** for $7919^a \times 7919^b \times \ldots$ where • only 7919 used • a, b, … are 1 or 2 or 4 or 8 • $a + b + \ldots = 11$
6(b)(iii)	[No] R[$18 \div 13$] = a value or $\neq 0$ oe	**1**	
6(c)	R[$7919^{64} \div 7$] = 2 2 + 5 = 7 oe leading to 'yes' oe	**2**	**B1** for remainder 2 linked to 7919^{64}
Communication: seen in one of the following questions		**1**	
6(a)(i)	R[$2 \div 5$] and R[$8 \div 5$] seen		
6(b)(ii)	$72 \div 13$ or $384 \div 13$ or $2048 \div 13$		
6(c)	R[$7919 \div 7$] = 2		

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Question	Answer	Marks	Partial Marks
B	MODELLING ORBITING SATELLITES		
7(a)(i)	Point (770, 100) plotted	**1**	
7(a)(ii)	Correct straight line through (770, 100)	**1**	
7(a)(iii)	[t =] (0.015 to 0.025) h + (80 to 89)	**2**	**B1** for either gradient or y-intercept correct
7(b)	[Model A: t =] 300 to 650 [Model B: t =] 728 to 729 [Model B]	**2**	**B1** for correct model B time
7(c)	35 800 to 35 900	**2**	**B1** for one of 8 670 000 to 8 680 000 or $7.53\ldots \times 10^{13}$ or 42 200 to 42 240
8	2872.1 to 2872.2 and very close oe	**3**	**B2** for 2872.1 to 2872.2 or **B1** for 60 553 **FT** *their* 2872. … for comment
9(a)	Correct sketch 	**1**	
9(b)	2070 to 2074 and not close oe	**2**	**B1** for 2070 to 2074
9(c)(i)	43	**1**	
9(c)(ii)	Increasing radiation decreases descent time oe	**1**	
9(c)(iii)	$D = ks^{-1}$ only indicated and valid reason	**2**	**B1** for indicating $D = ks^{-1}$ only
Communication: seen in four of the following questions		**2**	**C1** for two or three opportunities seen
7(b)	$\sqrt{(20450+6370)^3}$ seen		
7(c)	'km' seen as units		
8	$\frac{114027+7079}{2}$ seen		
9(b)	$5\times10^{-24}\times577^{9.64}$ or $\left(5\times10^{-24}\right)[\times]577^{9.64}$ seen		
9(c)(i)	'Days' seen as units		