GradeMax

Cambridge Assessment International Education

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/62**

Paper 6 (Extended) **February/March 2023**

MARK SCHEME

Maximum Mark: 60

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 February/March 2023 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

© UCLES 2023

[Turn over

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.

© UCLES 2023

Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

© UCLES 2023

GradeMax

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

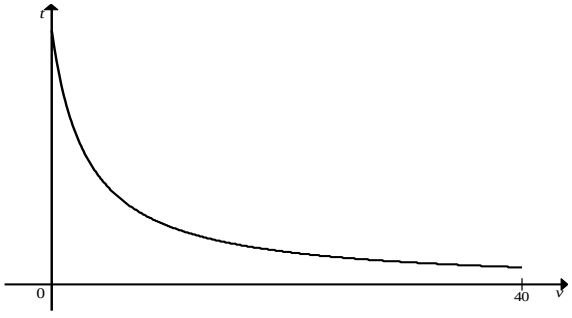
© UCLES 2023

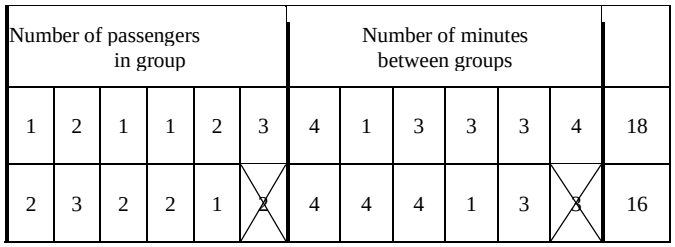
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Partial Marks</th></tr>
<tr><td colspan="4">INVESTIGATION: SPLIT NUMBERS</td></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>start</th><th>T</th><th>U</th><th>T^2</th><th>U^2</th><th>$T^2 - U^2$</th><th>$T - U$</th><th>$\frac{T^2 - U^2}{T - U}$</th></tr>
<tr><td>125</td><td>120</td><td>5</td><td>14400</td><td>25</td><td>14375</td><td>115</td><td>125</td></tr>
<tr><td>34</td><td>30</td><td>4</td><td>900</td><td>16</td><td>884</td><td>26</td><td>34</td></tr>
<tr><td>42</td><td>40</td><td>2</td><td>1600</td><td>4</td><td>1596</td><td>38</td><td>42</td></tr>
<tr><td>50</td><td>50</td><td>0</td><td>2500</td><td>0</td><td>2500</td><td>50</td><td>50</td></tr>
<tr><td>151</td><td>150</td><td>1</td><td>22500</td><td>1</td><td>22499</td><td>149</td><td>151</td></tr>
<tr><td>7000</td><td>7000</td><td>0</td><td>49000000</td><td>0</td><td>49000000</td><td>7000</td><td>7000</td></tr>
</table>
</td><td>5</td><td>B1 for each correct row</td></tr>
<tr><td>1(b)</td><td>They are the same oe</td><td>1</td><td></td></tr>
<tr><td>1(c)</td><td>
<table>
<tr><th>start</th><th>T</th><th>U</th><th></th><th>$T^2 - U^2$</th><th>$T + U$</th><th>$\frac{T^2 - U^2}{T + U}$</th></tr>
<tr><td>125</td><td>120</td><td>5</td><td></td><td>14375</td><td>125</td><td>115</td></tr>
<tr><td>34</td><td>30</td><td>4</td><td></td><td>884</td><td>34</td><td>26</td></tr>
<tr><td>42</td><td>40</td><td>2</td><td></td><td>1596</td><td>42</td><td>38</td></tr>
<tr><td>50</td><td>50</td><td>0</td><td></td><td>2500</td><td>50</td><td>50</td></tr>
<tr><td>151</td><td>150</td><td>1</td><td></td><td>22499</td><td>151</td><td>149</td></tr>
<tr><td>7000</td><td>7000</td><td>0</td><td></td><td>49000000</td><td>7000</td><td>7000</td></tr>
</table>
</td><td>2</td><td>FT their 884 and their 2500
B1 for four correct cells</td></tr>
<tr><td>1(d)</td><td>$T - U$ oe</td><td>1</td><td></td></tr>
<tr><td>1(e)(i)</td><td>$T^2 - TU + TU - U^2$</td><td>1</td><td></td></tr>
<tr><td rowspan="2">1(e)(ii)</td><td>$(180 - 5)(180 + 5)$</td><td>C1</td><td></td></tr>
<tr><td>175×185 isw</td><td>1</td><td></td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Partial Marks</th></tr>
<tr><td rowspan="3">2(a)</td><td>Table headings including $T - U$ and $T^2 + U^2$</td><td>C1</td><td></td></tr>
<tr><td>Correct answer in the table to a relevant division
or division with correct answer below the table</td><td>C1</td><td></td></tr>
<tr><td>Complete their table
<table>
<tr><th>start</th><th>$T - U$</th><th>$T + U$</th><th>$T^2 + U^2$</th><th>$\frac{T^2+U^2}{T+U}$ or $T + U$ factor</th><th>$\frac{T^2+U^2}{T-U}$ or $T - U$ factor</th></tr>
<tr><td>35</td><td>25</td><td>35</td><td>925</td><td>26.4 or No or ×</td><td>37 or Yes or ✓</td></tr>
<tr><td>36</td><td>24</td><td>36</td><td>936</td><td>26 or Yes or ✓</td><td>39 or Yes or ✓</td></tr>
<tr><td>37</td><td>23</td><td>37</td><td>949</td><td>25.6 or No or ×</td><td>41.26 or No or ×</td></tr>
<tr><td>38</td><td>22</td><td>38</td><td>964</td><td>25.368 or No or ×</td><td>43.8 or No or ×</td></tr>
<tr><td>39</td><td>21</td><td>39</td><td>981</td><td>25.15 or No or ×</td><td>46.7 or No or ×</td></tr>
<tr><td>40</td><td>40</td><td>40</td><td>1600</td><td>40 or Yes or ✓</td><td>40 or Yes or ✓</td></tr>
</table></td><td>3</td><td>B2 for one correct column giving an answer to division by $T + U$ or $T - U$, assuming both if a joint column seen
or B1 for one correct column with 4 cells correct</td></tr>
<tr><td rowspan="2">2(b)</td><td>$U = 0$ soi as a general result
e.g. U will always be 0</td><td>1</td><td></td></tr>
<tr><td>$T^2 + U^2 = T^2$ and both $T + U$ and $T - U = T$.</td><td>1</td><td></td></tr>
<tr><td>2(c)(i)</td><td>$[(T + U)^2 - 2TU =]\ T^2 + 2TU + U^2 - 2TU = T^2 + U^2$</td><td>1</td><td></td></tr>
<tr><td>2(c)(ii)</td><td>$T + U$ is a factor of $(T + U)^2$

so therefore $T + U$ is a factor of [–] $2TU$</td><td>1</td><td></td></tr>
<tr><td rowspan="2">2(d)</td><td>$(T - U)^2 = T^2 + U^2 - 2TU$
or $T^2 + U^2 = (T - U)^2 + 2TU$</td><td>2</td><td>B1 for $T^2 - 2TU + U^2$</td></tr>
<tr><td>$T - U$ is a factor of $(T - U)^2$

so therefore $T - U$ is a factor of $2TU$</td><td>1</td><td></td></tr>
<tr><td rowspan="2">3(a)</td><td>One relevant calculation seen
or for identifying a correct pair of values for T and U</td><td>C1</td><td></td></tr>
<tr><td>
<table>
<tr><th>start number</th><th>$T - U$</th><th>$T^3 - U^3$</th><th>$\frac{T^3-U^3}{T-U}$</th><th>$T^2 + TU + U^2$</th></tr>
<tr><td>12</td><td>8</td><td>992</td><td>124</td><td>124</td></tr>
<tr><td>25</td><td>15</td><td>7875</td><td>525</td><td>525</td></tr>
<tr><td>31</td><td>29</td><td>26 999</td><td>931</td><td>931</td></tr>
</table></td><td>2</td><td>B1 for each column</td></tr>
</table>

Question	Answer	Marks	Partial Marks
3(b)(i)	$\frac{T^3-U^3}{T-U}=T^2+TU+U^2$ or $124\times 8=992$ or $525\times 15=7875$ or $931\times 29=26999$	**C1**	
	T^3-U^3	**1**	
3(b)(ii)	$T^3+T^2U+TU^2-UT^2-TU^2-U^3=T^3-U^3$	**1**	
MODELLING: FERRIES			
4(a)(i)	<table><tr><td>Trial 9</td><td>4</td><td>3</td><td>3</td><td>3</td><td>13</td></tr><tr><td>Trial 10</td><td>3</td><td>3</td><td>2</td><td>3</td><td>11</td></tr></table>	**2**	**B1** for each correct row
4(a)(ii)	11.6	**1**	**FT** *their* 13 and *their* 11
	minutes or min	**C1**	
4(a)(iii)	14.5 + 11.6	**C1**	**FT** *their* 11.6
	26.1 min	**1**	**FT** *their* 11.6
4(b)(i)	$\frac{4}{16}\times 60=15$ or $\frac{4}{16}=\frac{1}{4}$ hour = 15 min	**1**	
4(b)(ii)	$t=\frac{240}{v+3}$	**2**	**B1** for $\frac{distance}{speed}$ used e.g $\frac{4}{v+3}$ seen
4(b)(iii)	Correct sketch 	**1**	Correct shape not touching or crossing *v* axis
	t-intercept labelled as 80	**C1**	

Question	Answer	Marks	Partial Marks
4(b)(iv)	[v =] 22 seen in working or on sketch or $\frac{240}{25}$ or $\frac{4}{25}$ seen	**C1**	
	9.6 min	**1**	If 0 scored for **4(b)(iv)** **SC1** for 8.57
5(a)(i)	65 to 99	**1**	
5(a)(ii)		**3**	**B1** for 2 correct sections **B1** for 18 or 16 or 19
5(a)(iii)	14	**1**	**FT** *their* 18 and *their* 16
	12.1	**1**	**FT** *their* 26.1 – *their* 14
5(a)(iv) (a)	Groups are more likely oe	**1**	
5(a)(iv) (b)	e.g. Run more trials Increase the number of passenger groups to more than 3 Increase the number of minutes between groups to more than 4 Use two-digit numbers for number of minutes between groups Use three-digit numbers for number of passengers in group	**1**	
5(b)	$20 = \frac{240}{v+3} + 14$ oe or horizontal line at t = 6 or at t = 20 drawn on appropriate sketch	**C1**	**FT** 20 = *their* $\frac{240}{v+3}$ + *their*14
	Correct rearrangement of *their* equation to isolate v or an equation with v coefficient = 1 or horizontal line at t = 6 or at t = 20 labelled correctly	**C1**	
	37 nfww	**1**	**FT** their equation dep on first C1 **SC1** for 9 following 20 $= \frac{240}{v+3}$

Question	Answer	Marks	Partial Marks
6(a)	$[t =] \frac{240}{v+2} + \frac{60}{v} + 16 + their14$ oe	**C2**	**C1** for $\left(\frac{4}{v+2} + \frac{1}{v-1+1}\right)[\times 60]$ or three of the four terms correct
	$t = \frac{240v + 60(v+2) + 30v(v+2)}{v(v+2)}$ or better	**C1**	
	30 nfww	**1**	
6(b)	$t = \frac{30(40^2 + 12(40) + 4)}{40(42)}$ oe or $35 = \frac{(their30)(v^2 + 12v + 4)}{v(v+2)}$ oe	**C1**	**FT** *their*30
	No and $t = 37$[.21… minutes] or No and $v = 58$[.41… km/h]	**1**	**FT** *their*30