

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS**0607/61**

Paper 6 (Extended)

October/November 2024

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 October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **10** printed pages.

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 descriptions 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.

Mathematics-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, non-integer 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 or sign 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 A or B 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.

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.

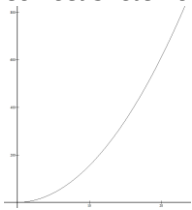
When a part of a question has two or more ‘method’ steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation ‘dep’ is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

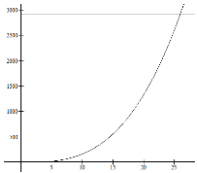
Abbreviations

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

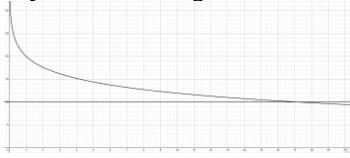
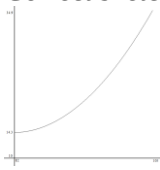
Question	Answer	Marks	Partial Marks																								
1(a)	<table border="1"> <tr> <th>n</th><th>Horizontal</th><th>Diagonal</th><th>Total</th></tr> <tr> <td>1</td><td>0</td><td>2</td><td>2</td></tr> <tr> <td>2</td><td>1</td><td>4</td><td>5</td></tr> <tr> <td>3</td><td>2</td><td>6</td><td>8</td></tr> <tr> <td>4</td><td>3</td><td>8</td><td>11</td></tr> <tr> <td>5</td><td>4</td><td>10</td><td>14</td></tr> </table>	n	Horizontal	Diagonal	Total	1	0	2	2	2	1	4	5	3	2	6	8	4	3	8	11	5	4	10	14	3	B1 for each correct row If 0 scored, SC1 for last column = sum of other two in all rows
n	Horizontal	Diagonal	Total																								
1	0	2	2																								
2	1	4	5																								
3	2	6	8																								
4	3	8	11																								
5	4	10	14																								
1(b)	$3n - 1$ oe	2	B1 for $3n$ oe or $kn - 1$ ($k \neq 0$)																								
	three differences of 3 for total cards or $n - 1 + 2n$ or	C1																									

Question	Answer	Marks	Partial Marks																								
1(c)	$3p - 1 = 368$ or $(368 + 1) \div 3$	C1	FT <i>their</i> $(3n - 1)$ FT correct inverse numerical calculation from <i>their</i> $(3n - 1)$																								
	246	2	B1 for 123 or B1FT <i>their</i> $p \times 2$ correctly evaluated as final answer or $368 - (\textit{their } p - 1)$ oe correctly evaluated as final answer																								
2(a)	<table><tr><td>h</td><td>Horizontal</td><td>Diagonal</td><td>Total</td></tr><tr><td>1</td><td>0</td><td>2</td><td>2</td></tr><tr><td>2</td><td>1</td><td>6</td><td>7</td></tr><tr><td>3</td><td>3</td><td>12</td><td>15</td></tr><tr><td>4</td><td>6</td><td>20</td><td>26</td></tr><tr><td>5</td><td>10</td><td>30</td><td>40</td></tr></table>	h	Horizontal	Diagonal	Total	1	0	2	2	2	1	6	7	3	3	12	15	4	6	20	26	5	10	30	40	3	B1 for each correct row If 0 scored, SC1 for last column = sum of other two in all rows
	h	Horizontal	Diagonal	Total																							
1	0	2	2																								
2	1	6	7																								
3	3	12	15																								
4	6	20	26																								
5	10	30	40																								
	House 4 or House 5 correctly drawn or 3 differences from 1, 2, 3, 4 in horizontal column or 3 differences from 4, 6, 8, 10 in diagonal column or 3 differences from 5, 8, 11, 14 in total column	C1																									
2(b)	$h^2 + h$ or $h(h + 1)$ oe	2	B1 for a quadratic expression or for bad form e.g. $h + 1 \times h$																								
2(c)	$0.5h(h - 1) + h^2 + h$ oe	C1	FT <i>their</i> $(h^2 + h)$																								
	$1.5h^2 + 0.5h$ oe isw	1																									

Question	Answer	Marks	Partial Marks																								
2(d)	$1.5k^2 + 0.5k = 737$ oe or correct sketch of $y = 1.5k^2 + 0.5k$ oe 	C1	FT <i>their</i> $(1.5k^2 + 0.5k)$ for both equation and sketch																								
	$\frac{-0.5 \pm \sqrt{0.5^2 - 4 \times 1.5 \times -737}}{2 \times 1.5}$ or better or $(3k + 67)(k - 22)$ or $(1.5k - 33)(k + 22.\dot{3})$ oe or line drawn at $y = 737$ on sketch or solution indicated at $y = 0$ on appropriate sketch or 3 correct trials of integer $k > 10$ in $1.5k^2 + 0.5k$ or triangle drawn with at least 13 rows with 3 totals correct from rows > 10	C1																									
	22 cao	1																									
3(a)	<table border="1" data-bbox="304 1173 839 1565"> <thead> <tr> <th>t</th><th>Horizontal H</th><th>Diagonal</th><th>Total</th></tr> </thead> <tbody> <tr> <td>1</td><td>0</td><td>2</td><td>2</td></tr> <tr> <td>2</td><td>1</td><td>8</td><td>9</td></tr> <tr> <td>3</td><td>4</td><td>20</td><td>24</td></tr> <tr> <td>4</td><td>10</td><td>40</td><td>50</td></tr> <tr> <td>5</td><td>20</td><td>70</td><td>90</td></tr> </tbody> </table>	t	Horizontal H	Diagonal	Total	1	0	2	2	2	1	8	9	3	4	20	24	4	10	40	50	5	20	70	90	2	B1 for one correct row If 0 scored, SC1 for last column = sum of other two in both rows
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2	1	8	9																								
3	4	20	24																								
4	10	40	50																								
5	20	70	90																								
3(b)	Substitution of any t, H pair from the table into given equation or Method of differences with two third differences of 1 and $6a = 1$	C1	FT <i>their</i> H for given t																								
	$(a =) 1$ $(H =) \frac{1}{6}t(t+1)(t-1)$ oe	2	M1 for first correct step to solve for a or B1 for $a = 1$																								

Question	Answer	Marks	Partial Marks
3(c)	Correct sketch of $H = \frac{1}{6}t(t+1)(t-1)$ and line $H = 2925$ oe  or $\sqrt[3]{2925 \times 6}$ rounded to 26 or 3 correct trials of integer $t > 19$ in <i>their</i> $H = \frac{1}{6}t(t+a)(t-a)$	C2	FT $H = \frac{1}{6}t(t+a)(t-a)$ for <i>their</i> value of a C1 FT for correct sketch without correct straight line C1 for $\sqrt[3]{2925 \times 6}$ C1 for 1 correct trial of integer $t > 19$ in <i>their</i> $H = \frac{1}{6}t(t+a)(t-a)$
	Substitution of $t = 26$ into $1.5h^2 + 0.5h$	C1	FT <i>their</i> 26 and <i>their</i> $(1.5h^2 + 0.5h)$ in 2(c)
	1027	2	B1 for $[t =] 26$

Question	Answer	Marks	Partial Marks
Modelling			
4(a)	4 points correctly plotted	2	B1 for 2 points correctly plotted
4(b)(i)	Correct ruled line drawn	1	
4(b)(ii)	$y = \frac{1}{12}x + \frac{41}{6}$ oe	3	M1 for $\frac{13-10}{74-38}$ oe M1FT for substituting (38, 10) or (74, 13) or (56, 11.5) into $y = (their\ m)x + c$ oe If 0 scored SC2 for $y = 0.0836x + 6.82$ or SC1 for $y = 0.08x + 6.8$
4(b)(iii)	For horizontal line on graph at $y = 12$ or substitution of $y = 12$ into $y = \frac{1}{12}x + \frac{41}{6}$	C1	FT $their\ y = \frac{1}{12}x + \frac{41}{6}$
	62	1	
4(b)(iv)	Not valid as outside the range of the given data oe	2	B1 for outside the range of the given data/model
	OR		
	$[y =] \frac{1}{12} \times 20 + \frac{41}{6}$ or sketch graph and indication of (20, 8.5) seen or $9.58 = \frac{1}{12}x + \frac{41}{6}$ or horizontal line drawn at 9.58 on graph	C1	FT $their$ equation
	Not valid and [9.58] is slower/worse than model oe or [9.58] is the time for someone older than 20 oe or The answer is not close enough oe	1	
5(a)	11	1	
	Seconds or s	C1	

Question	Answer	Marks	Partial Marks
5(b)	$11 = 268 + c \times 13^{0.0139}$	C1	FT <i>their</i> 11
	$(c =) -248$ $(y =) 268 - 248 \times x^{0.0139}$	2	M1FT for <i>their</i> 11 – 268 = $c \times 13^{0.0139}$ or $\frac{\text{their}11}{13^{0.0139}} = \frac{268}{13^{0.0139}} + c$ or B1 for $c = -248$
5(c)	Correct sketch of model and horizontal line at $y = 10$ showing intersection 	M2	FT <i>their</i> –248 M1 for correct sketch of model or $10 = 268[+] - 248 \times x^{0.0139}$
	$[x =] 16.8 \text{ to } 17.2$ leading to 17	A2	A marks dep M1 A1 for 16.8 to 17.2
6(a)	Correct sketch 	2	B1 for positive quadratic starting above the x axis with continuous positive gradient B1dep for curve reaching at least $x = 100$ and touching y axis
	Correct vertical scale indicated	C1	
6(b)	Intersection marked on sketch in (a) at approx. $x = 100$ or 27 [seconds] or $0.0381 \times 100^2 - 6.23 \times 100 + 269$	C1	
	0.01 seconds	1	
6(c)	92 years	1	

Question	Answer	Marks	Partial Marks
7	32 or 33	1	
	Sketch or line on graph in 4(a) or $9.58 = \frac{1}{12}x + \frac{41}{6}$ oe	C1	FT <i>their</i> model in 4(b)(ii)
	19	1	
	Sketch or $9.58 = 268 - 248 \times x^{0.0139}$	C1	FT <i>their</i> model in 5(b)
	There is no age for model in Q6 oe	1	