

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS**0607/43**

Paper 4 (Extended)

May/June 2024**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.

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

Cambridge International is publishing the mark schemes for the May/June 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **9** 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.

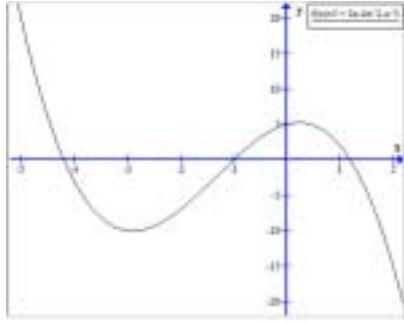
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation 'dep' is used to indicate that a particular M or B mark is dependent on an earlier mark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

Abbreviations

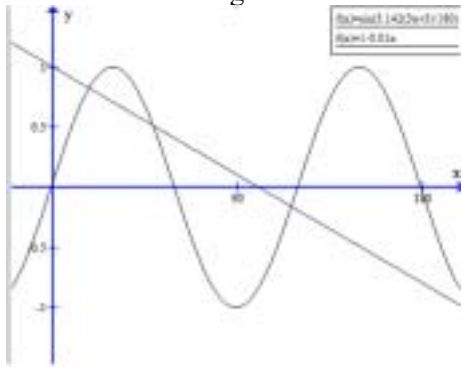
awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	0	1	
1(a)(ii)	2	1	
1(a)(iii)	6	1	
1(a)(iv)	3	1	
1(a)(v)	2.175	2	M1 for $[0 \times 26] + 1 \times 20 + 2 \times 23 \dots$
1(b)	14	3	M2 for $\frac{[0 \times 18] + 1 \times 31 + 2 \times 27 + 3 \times 18 + 4 \times n + 5 \times 12 + 6 \times 5}{18 + 31 + 27 + 18 + n + 12 + 5} = 2.28$ oe or M1 for $[0 \times 18] + 1 \times 31 + 2 \times 27 + 3 \times 18 + 4 \times n + 5 \times 12 + 6 \times 5$ or for $(18 + 31 + 27 + 18 + n + 12 + 5) \times 2.28$
2(a)	2400	2	M1 for $\frac{3000}{5}$
2(b)	2.8	3	M2 for $\frac{3000 \times r \times 10}{100} = 840$ oe or M1 for $\frac{3000 \times r \times 10}{100}$ or B1 for [1 year interest] = 84
2(c)	2.6[0]	3	M2 for $\sqrt[8]{\frac{7367.67}{6000}}$ oe or M1 for $6000(\dots)^8 = 7367.67$
2(d)	23 cao	4	B3 for 22.7 or 22.72 to 22.73 OR M3 $n \log \left(1 + \frac{1.8}{100} \right) = \log \left(\frac{6000}{4000} \right)$ oe or good sketch indicating value between 22 and 23 or correct trials reaching 22 and 23 or M2 for $\left(1 + \frac{1.8}{100} \right)^n = \frac{6000}{4000}$ oe or suitable graph with $n > 1$ or at least 3 correct trials or M1 for $4000 \times \left(1 + \frac{1.8}{100} \right)^n = 6000$ oe soi by at least 2 correct trials with $n > 1$

Question	Answer	Marks	Partial Marks
3	For all parts accept decimals or percentages with the usual rules for 3sf. Do not penalise incorrect cancelling or converting. Do not accept ratios or words		
3(a)(i)	$\frac{2}{3}$ oe	1	
3(a)(ii)	$\frac{1}{2}$ oe	1	
3(b)(i)	$\frac{1}{36}$ oe	2	M1 for $\frac{1}{6} \times \frac{1}{6}$
3(b)(ii)	$\frac{35}{36}$ oe	1	FT 1 – <i>their</i> (b)(i)
3(c)(i)	0.52 oe 0.72 oe 0.16 oe Correctly placed	2	B1 for one correctly placed
3(c)(ii)	0.4368 oe	2	M1 for <i>their</i> 0.52×0.84 oe
4(a)	$-\frac{2}{3}$ oe $\frac{8}{3}$ or $2\frac{2}{3}$ oe	3	B2 for one correct or M1 for correctly isolating y oe
4(b)	gradient = $\frac{3}{2}$	M1	FT 1 ÷ <i>their</i> $-\frac{2}{3}$
	substituting (2, 10) into $y = \text{their } m + c$	M1	FT <i>their</i> $m \neq -\frac{2}{3}$
	completing to $2y - 3x = 14$ with at least one line of working and no errors	A1	
4(c)	Correctly equating coefficients or sketch of one equation with positive slope and positive y -intercept	M1	If 0 scored, SC1 for correct answer with no working
	Correct method to eliminate one variable or sketch of other equation with negative slope and positive y -intercept	M1	
	$x = -2$ in correct answer space	A1	
	$y = 4$ in correct answer space	A1	

Question	Answer	Marks	Partial Marks
5(a)	Correct sketch 	2	With minimum in 3rd quadrant and maximum in 1st quadrant B1 for any cubic with negative x^3
5(b)	−4.19 or −4.193 to −4.192 −1 1.19 or 1.192 to 1.193	3	B1 for each or B1 for −1 and B1 for −4.2 and 1.2
5(c)	(−2.9[0], −10.1) or (−2.897 to −2.896, −10.05...)	2	B1 for each coordinate
5(d)	<i>their</i> $-2.9[0] < a < 0.23[0]$	2	−2.896 to 2.897, 0.2301... B1 for 0.23[0] seen or <i>their</i> $-2.9[0] < a < k$
5(e)	Integer ≤ -11 or ≥ 6	1	
6(a)(i)	Triangle at (1, −2), (4, −2), (3, −3)	2	B1 for reflection in $y = -x$ or correct size and orientation
6(a)(ii)	Rotation 90° clockwise oe [centre] (4, 1)	3	B1 for each
6(a)(iii)	Enlargement [Scale factor] −2 [centre] (−1, 3)	3	B1 for each
6(b)(i)	Translation $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	2	B1 for each
6(b)(ii)	Stretch $y = 1$ [invariant] factor $\frac{1}{3}$	3	B1 for each
7(a)	$\pi d = 37 - 12 - 12$ oe	M1	
	4.137 to 4.138...	A1	

Question	Answer	Marks	Partial Marks
7(b)	40.3 or 40.4 or 40.33 to 40.36...	3	M2 for $2 \times \sin^{-1} \frac{4.14}{12}$ oe or $\cos ACB = \frac{12^2 + 12^2 - (2 \times 4.14)^2}{2 \times 12 \times 12}$ or M1 for $\sin(\dots) = \frac{4.14}{12}$ or $(2 \times 4.14)^2 = 12^2 + 12^2 - 2 \times 12 \times 12 \times \cos ACB$
7(c)	60[.0] or 60.1 or 60.01 to 60.13	3	M1 for $\frac{1}{2} \times 12 \times 12 \times \sin(\text{their } b)$ oe M1 for $2 \times \frac{1}{2} \times \pi \left(\frac{4.14}{2} \right)^2$ oe
7(d)	28.2 or 28.3 or 28.23 to 28.26	3	M2 for $37 \times \sqrt{\frac{35}{\text{their } c}}$ oe or M1 for $\sqrt{\frac{35}{\text{their } c}}$ or $\sqrt{\frac{\text{their } c}{35}}$ or $\frac{35}{\text{their } c} = \left(\frac{p}{37} \right)^2$
8(a)	$h^2 = 0.8^2 - 0.35^2 - 0.35^2$ oe	M3	M2 for $0.8^2 = 0.35^2 + 0.35^2 + h^2$ oe or M1 for $0.35^2 + 0.35^2$ or $0.7^2 + 0.7^2$ oe
	0.6284 to 0.6285	A1	
8(b)	165 or 165.0 to 165.2	5	B4 for 262 or 262.1 to 262.2... OR M1 for $6 \times 4.9 \times 4.9$ M1 for $\pi \times 1.2^2 \times 25$ M1 for $\frac{1}{3} \times 0.7 \times 0.7 \times 0.628$ [$\times 49$] M1 for at least 1 of <i>their</i> volumes $\times 0.63$
9(a)(i)	$-\frac{2}{7}$	2	M1 for $2x + 5x = 1 - 3$ or better
9a)(ii)	-5 -1	2	B1 for each or M1 for $x + 3 = \pm 2$
9(b)	$3x^2y^2(2x - y)$ Final answer	2	B1 for correctly extracting 2 or more factors
9(c)	$\frac{x-31}{(2x+3)(x-5)}$ or $\frac{x-31}{2x^2-7x-15}$ Final answer	3	B1 for $5(x-5) - 2(2x+3)$ oe ISW B1 for denominator $(2x+3)(x-5)$ oe

Question	Answer	Marks	Partial Marks
9(d)	$\frac{-3 \pm \sqrt{3^2 - 4 \times 2 \times -7}}{2 \times 2}$ or suitable sketch(es) with both answers indicated	M2	M1 for $\sqrt{3^2 - 4 \times 2 \times -7}$ or M1 for $\frac{-3 + \sqrt{p}}{2 \times 2}$ or $\frac{-3 - \sqrt{p}}{2 \times 2}$ Denominator must be shown as 2×2 to earn the second M1 but a denominator of 4 is condoned for M2
	1.27 and -2.77 cao	B1	
10(a)	$3\frac{1}{2}$ oe	1	
10(b)	6	2	M1 for $5 - \frac{1}{2}x = 2$
10(c)	$3\frac{1}{2} - 1\frac{1}{2}x$ or $\frac{7-3x}{2}$ oe Final answer	2	M1 for $5 - \frac{1}{2}(3(x+1))$ oe
10(d)	$\frac{x-3}{3}$ oe Final answer	2	M1 for $x = 3(y+1)$ or $x+1 = \frac{y}{3}$ or $y-3 = 3x$
10(e)	1	2	B1 for h(90) or M1 for $\sin(3(x+1))$ oe
10(f)	$\sin(3(x+1))$ soi	1	
	Correct sketches e.g. 	2	or a single graph of $h(g(x)) - 1 + 0.01x$ B1 for each graph
	17.5 or 17.52... 48.7 or 48.71... 115.9 or 115.94...	2	B1 for 1 correct.
11(a)	$[\cos B] = \frac{72^2 + 85^2 - 102^2}{2 \times 72 \times 85}$	M2	M1 for $102^2 = 72^2 + 85^2 - 2 \times 72 \times 85 \times \cos[B]$
	80.57...	A1	
11(b)	319.4	2	B1 for 40.6 or 139.4

Question	Answer	Marks	Partial Marks
11(c)	14 17	6	M2 for $\sin [A] = \frac{85 \sin 80.6}{102}$ or $\cos [A] = \frac{72^2 + 102^2 - 85^2}{2 \times 72 \times 102}$ or M1 for $\frac{85}{\sin A} = \frac{102}{\sin 80.6}$ or $85^2 = 72^2 + 102^2 - 2 \times 72 \times 102 \cos A$ M1 for $[AP =] 72 \cos \text{their } A$ oe M1 for $[\text{time} =] \text{their } AP \div 32$ M1 adding <i>their</i> time to 13 00 If 0 scored, SC1 for showing BP on diagram with right angle correctly placed on AC