Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS	**0607/42**
Paper 4 (Extended)	**October/November 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 October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

[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 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.
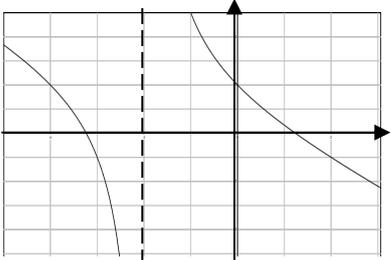
Types of mark

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.
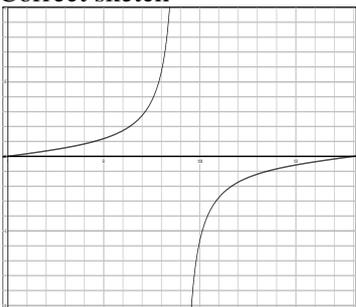
Abbreviations

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)	[P] (6, 0) [Q] (0, 4)	2	**B1** for each or for correct answers in reverse
1(b)(i)	$\begin{pmatrix} 6 \\ -6 \end{pmatrix}$	1	
1(b)(ii)	(1, 2)	2	**B1** for each coordinate
1(c)	11.4 or 11.40...	2	**M1** for $7^2 + 9^2$ oe
1(d)	$3x + 13$	2	**B1** for $y = 3x + k$, $k \neq 0$ or **M1** for $7 = 3(-2) + c$ or $y - 7 = 3(x - (-2))$

Question	Answer	Marks	Partial Marks
2(a)	Correct sketch	**2**	**B1** each branch Max 1 mark if branches joined or if significant overlap or gap
2(b)	$x = -2$ drawn	**1**	Vertical line between branches
2(c)	$-3, 2$	**2**	**B1** for each or **B1** for $(-3, -1)$ and $(2, -1)$ as final answer
2(d)(i)	1.09 or 1.094 to 1.095	**2**	**B1** for correct sketch of $y = x^2 - 1$ added to diagram or if y co-ordinate also given
2(d)(ii)	$x < -2$, $x >$ *their* positive 1.09	**2**	**B1** for each
3(a)	104	**1**	
3(b)	54.4[0]	**2**	**M1** for $64 - \dfrac{15}{100} \times 64$ oe or **B1** for 9.60
3(c)	3200	**2**	**M1** for $x \times \left(1 + \dfrac{1.8}{100}\right)^3 = 3375.93$ oe
3(d)	8 nfww	**4**	**B3** for 7.47 or 7.474 to 7.475 or **M3** for $n\log\left(1 - \dfrac{12}{100}\right) = \log\left(\dfrac{5000}{13000}\right)$ oe or good sketch indicating value between 7 and 8 or correct trials reaching 7 and 8 or **M2** for $\left(1 - \dfrac{12}{100}\right)^n = \dfrac{5000}{13000}$ oe or suitable graph with $n > 1$ or at least 3 correct trials or **M1** for $13000 \times \left(1 - \dfrac{12}{100}\right)^n = 5000$ oe soi by at least 2 trials with $n > 1$

Question	Answer	Marks	Partial Marks
4(a)(i)	$2 \times \dfrac{2}{3} \times \pi \times 3^3$ oe	**M1**	
	$\pi \times 3^2 \times 15$	**M1**	
	537.2 to 537.3	**A1**	
4(a)(ii)	9.64 or 9.636 to 9.639	**3**	**M2** for $\sqrt[3]{\dfrac{537}{600}}$ or **M1** for $\dfrac{537}{600}$
4(b)	11.5 or 11.46...	**5**	**M3** for $\dfrac{120}{360} \times \pi \times r^2 - \dfrac{1}{2} \times r^2 \times \sin 120 = 18.4$ oe OR **M1** for $\dfrac{120}{360} \times \pi \times r^2$ oe **M1** for $\dfrac{1}{2} \times r^2 \times \sin 120$ oe AND **M1** for $\dfrac{120}{360} \times 2 \times \pi \times their\ r$ oe
5(a)(i)	4.36 or 4.358 to 4.359	**2**	**M1** for $7^2 - 2(1.5)(10)$ or better
5(a)(ii)	$\sqrt{v^2 + 2as}$ final answer	**2**	**M1** for correct rearrangement making u^2 the subject of the equation **M1** for correct square root of their expression Max 1 mark if final answer incorrect
5(b)	A –1 $14 - 3n$ oe	**3**	**B1** **B2** or **B1** for $k - 3n$ for integer k or $14 - kn$ $(k \neq 0)$
	B 24, 35	**2**	**B1** for each
	C $\dfrac{1}{64}$ 4^{2-n} oe	**3**	**B1** **B2** or **B1** for 4^k or $2^{(2k)}$ $(k \neq 0)$
6(a)(i)	Rotation 90° clockwise oe [centre] (3, 2)	**3**	**B1** for each

Question	Answer	Marks	Partial Marks
6(a)(ii)	Enlargement [scale factor] –2 [centre] (2, 0)	**3**	**B1** for each
6(b)	Image at (1, 1), (1, 2), (–3, 1)	**2**	**B1** for stretch factor 2 with invariant line $x = k$ or $y = 5$
7(a)	 -3 $\qquad\qquad$ 1	**2**	**B1** for one circle correct at end of the line or if correct circles are not joined by a line
7(b)(i)	$-4 \leq x < 2$	**2**	**B1** for $-4 \leq x$ or for $x < 2$ or for $-8 \leq 2x < 4$
7(b)(ii)	–4, –3, –2, –1, 0, 1	**2**	**FT** *their* (i) **B1** if one omission or extra
7(c)	25	**3**	**M1** for correct expansion **M1** for correctly collecting their like terms
7(d)(i)	$y + 5 + 8y = y(y + 5)$ oe	**M1**	Correct removal of fractions
	$y + 5 + 8y = y^2 + 5y$ oe	**M1**	Correct removal of brackets
	Leading to $y^2 - 4y - 5 = 0$	**A1**	No errors or omissions
7(d)(ii)	$(y - 5)(y + 1)$	**M2**	**B1** for $(y + a)(y + b)$ with $ab = -5$ or $a + b = -4$ or for $y(y + 1) - 5(y + 1)$ or for $y(y - 5) + [1](y - 5)$
	–1, 5	**A1**	**strict FT** *their* factors
8(a)	13.9 or 13.89...	**2**	**M1** for $7^2 + 12^2$
8(b)	59.7 or 59.74...	**2**	**M1** for $\tan = \dfrac{12}{7}$ oe
8(c)	12.4 or 12.37 to 12.38	**3**	**M2** for $\sqrt{12^2 + 16^2 - 2 \times 12 \times 16 \cos 50}$ OR **M1** for $12^2 + 16^2 - 2 \times 12 \times 16 \cos 50$ **A1** for 153 or 153.1 to 153.2
8(d)	7.71 or 7.713...	**3**	**M2** for $12 \cos 50$ oe or **M1** for recognising shortest distance

Question	Answer	Marks	Partial Marks
8(e)	[0]61.9 or [0]61.89 to 61.91…	**5**	**M1** for $[AC^2 =] 7^2 + 16^2 - 2 \times 7 \times 16 \cos(90 + 50)$ **M2** for $[\sin CAB =] \dfrac{16 \sin(90 + 50)}{their\ AC}$ or **M1** for $\dfrac{their AC}{\sin(90 + 50)} = \dfrac{16}{\sin(CAB)}$ **M1** for $90 - their CAB$ oe or **SC1** for final answer 242 or 241.89 to 241.91… Or Line AB produced to E such that $AEC = 90^o$ **M1** for $CE = 16 \sin(90 - 50)$ **M1** for $BE = 16 \cos(90 - 50)$ **M1** for $\tan CAE = \dfrac{their CE}{7 + their BE}$ **M1** for $90 - their\ CAE$
9(a)	-7	**1**	
9(b)	$-\sqrt{3}$	**1**	
9(c)	Correct sketch 	**2**	**B1** for each branch. Max **B1** if branches joined or if too much overlap or too large a gap
9(d)	4	**2**	**M1** for $3^x + 1 = 82$ or better
9(e)	$\log_3(x - 1)$ or $\dfrac{\log(x - 1)}{\log 3}$ final answer	**2**	**M1** for $y - 1 = 3^x$ or for $x = 3^y + 1$ or $\log_3 x - 1$ or $\dfrac{\log x - 1}{\log 3}$

Question	Answer	Marks	Partial Marks
9(f)	$\dfrac{x^6 + 2x^3}{x^3 + 1}$ or $\dfrac{x^3(x^3 + 2)}{x^3 + 1}$ final answer	3	**M2** for $\dfrac{(x^3 + 1)^2 - 1}{x^3 + 1}$ oe or better or **M1** for $x^3 + 1 - \dfrac{1}{x^3 + 1}$
10(a)(i)	22.3	2	**M1** for at least 4 mid values soi
10(a)(ii)	$\dfrac{33}{50}$ oe	1	
10(a)(iii)	$\dfrac{34}{225}$ oe	3	**M2** for $\dfrac{34}{100} \times \dfrac{22}{99} + \dfrac{22}{100} \times \dfrac{34}{99}$ oe or **M1** for one product
10(b)(i)	31, 7, 9 correctly placed	2	**B1** for 7 in intersection
10(b)(ii)	7	1	**FT** *their* Venn diagram
10(b)(iii)	$\dfrac{4}{5}$ oe	1	**FT** *their* Venn diagram
10(b)(iv)	$\dfrac{7}{40}$	2	**M1** for $\dfrac{their\,7}{16} \times \dfrac{their\,7 - 1}{15}$
11(a)	$\dfrac{3(\sqrt{a} + 1)}{a - 1}$ or $\dfrac{3\sqrt{a} + 3}{a - 1}$	2	**M1** for $\times \dfrac{\sqrt{a} + 1}{\sqrt{a} + 1}$
11(b)	$[p =] -2gh$ $[q =] h^2 - g^2$	3	**B2** for one correct or **B1** for three terms correct in $gh - g^2\sqrt{3} + h^2\sqrt{3} - 3gh$
11(c)(i)	3.03×10^d	2	**B1** for figs 303 or **M1** for $[0].03 \times 10^d$ or $300 \times 10^{d-2}$
11(c)(ii)	9.28 or 9.283... $\times 10^{666}$	2	**B1** for figs 928 or 9283... or **M1** for 800×10^{1998} or 0.8×10^{2001} or k x 10^{666} with $9.284 \le k \le 9.35...$