CAMBRIDGE
International Education

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

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.

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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 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.

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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

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Question	Answer	Marks	Partial Marks
1(a)(i)	–4	**2**	**M1** for $3x = –14 + 2$ or $x - \frac{2}{3} = \frac{-14}{3}$
1(a)(ii)	1.5 or $\frac{15}{10}$ oe	**2**	**M1** for $7x + 3x = 26 – 11$ oe or better
1(b)	Correctly equating coefficients or sketch of one equation with negative slope and y intercept	**M1**	If 0 scored, **SC1** for answers that satisfy one equation. **SC1** for two correct answers with no working
	Correct method to eliminate one variable or sketch of other equation with negative slope and y intercept	**M1**	
	$x = –1.5$ oe	**A1**	
	$y = –2.5$ oe	**A1**	
1(c)	$x > 4$ and $x < –5$ Mark final answer	**4**	**M2** for **c**orrect sketch showing both answers or **M1** for appropriate sketch of $y = \lvert 2x + 1 \rvert$ OR **M2** for $2x + 1 > 9$ oe and $2x + 1 < –9$ oe or **M1** for either correct inequality or for $2x + 1 = 9$ and $2x + 1 = –9$ oe **B1** for $x > 4$ or $x < –5$ Mark final answer
2(a)(i)	47.4 or 47.375	**2**	**M1** for at least 4 correct mid-points soi
2(a)(ii)(a)	[7], 20, 40, 72, [100]	**1**	
In parts **(a)(ii)(b)** and **(a)(ii)(c)**, marks can only be earned with an increasing curve			
(a)(ii)(b)	Correct curve (20, 7), (35, 20), (40, 40), (60, 72), (80, 100)	**3**	**B1** for horizontal plot correct **B1FT** for at least 4 vertical plots correct
(a)(ii)(c)	24 to 28	**2**	**M1FT** for [UQ =] 61 to 63 or [LQ =] 35 to 37
2(b)	44	**3**	**M2** for $10 \times 25 + \frac{(20+k)}{2} \times 15 + \frac{(k+80)}{2} \times 10 \quad [= 27 \times 50]$ oe or **M1** for $\frac{(20+k)}{2}$ or $\frac{(k+80)}{2}$
3(a)	Correct triangle (–5, 0), (–5, –3), (–4, –3)	**2**	**B1** for translation $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -6 \end{pmatrix}$

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Question	Answer	Marks	Partial Marks
3(b)	Translation $\begin{pmatrix}-2\\6\end{pmatrix}$	**2**	**B1** for each
3(c)	Correct triangle (3, 6), (3, 7), (6, 7)	**2**	**B1** for correct rotation, incorrect centre or for correct rotation 90 anticlockwise
3(d)	Correct triangle (3, –6), (3, –7), (6, –7)	**2**	**B1** for correct size and orientation, wrong position or reflection in $y = -x$
3(e)	Rotation 90 anticlockwise oe [Centre] (4, –2)	**3**	**B1** for each
4(a)	73.92	**2**	**M1** for $84\times\frac{(100-12)}{100}$ soi or **B1** for 10.08
4(b)	1280	**2**	**M1** for $x\times\frac{100-25}{100}=960$ oe
4(c)(i)	732.09	**2**	**M1** for 600×1.051^4 oe
4(c)(ii)	11	**4**	**B3** for 10.3 or 10.26 to 10.27 or **M3** for $n\log1.051=\log\frac{1000}{600}$ or good sketch indicating value between 10 and 11 or correct trials reaching 10 and 11 or **M2** for $1.051^n=\frac{1000}{600}$ oe or sketch that could lead to solution e.g. $y=1.051^x$, $y=1.67$ or at least 3 correct trials with $n > 4$ or **M1** for $600\times1.051^n=1000$ oe or suitable graph e.g. $y=1.051^x$ or at least 2 trials with $n > 4$
4(d)(i)	75	**2**	**M1** for $[120\times]\frac{5}{5+3}$ oe
4(d)(ii)	$3[k](1+0.2):5[k](1-0.2)$	**M2**	**M1** for $5[k](1-0.2)$ or $3[k](1+0.2)$ or for *their* **(d)(i)**$(1-0.2)$
	Leading to $9:10$	**A1**	No errors seen
5(a)	trapezium	**1**	

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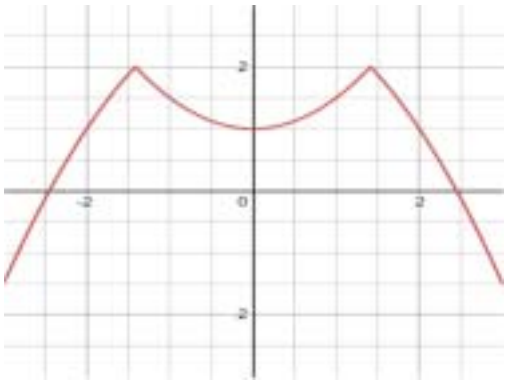
Question	Answer	Marks	Partial Marks
5(b)	Angle between tangent and radius oe	**1**	
5(c)(i)	119	**1**	
5(c)(ii)	22	**1**	
5(c)(iii)	39	**2**	**M1** for 180 – *their* **(i)** – *their* **(ii)**
5(c)(iv)	29	**2**	**B1** for 61 or 122 at centre (may be on diagram)
6(a)	Correct sketch 	**3**	**B2** if peaks below $y = 1$ (by eye) or rounded at peaks not cusps or outside branches convex from below. or **B1** for graph symmetrical about y-axis and in all 4 quadrants
6(b)	4.9[0] or 4.898 to 4.899	**2**	**B1** for 2.45 or –2.45 or 2.449... or –2.449… seen
6(c)	–2.24 or –2.236… 2.24 or 2.236…	**2**	**B1** for each or for both values seen
6(d)	(0, 1)	**1**	
6(e)	$k = 2$ $k < 1$	**2**	**B1** for each
7(a)(i)	0	**1**	
7(a)(ii)	$\frac{3}{5}$ oe	**1**	
7(a)(iii)	$\frac{6}{25}$ oe	**3**	**M2** for $\left(\frac{1}{5}\times\frac{1}{5}\right)+\left(\frac{2}{5}\times\frac{1}{5}\right)+\left(\frac{1}{5}\times\frac{1}{5}\right)+\left(\frac{1}{5}\times\frac{2}{5}\right)$ or correct sample space showing all 6 points or **M1** for 2 correct products or correct sample space showing at least 3 points or list of all correct pairs If 0 scored, **SC1** for $\frac{12}{25}$

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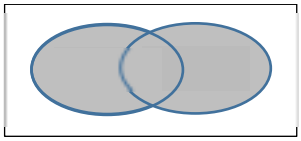
Question	Answer	Marks	Partial Marks
7(a)(iv)	$\frac{6}{25}$	**3**	**M2** for $\left(\frac{2}{5}\times\frac{2}{5}\right)+\left(\frac{1}{5}\times\frac{1}{5}\right)+\left(\frac{1}{5}\times\frac{1}{5}\right)$ or correct sample space showing all 6 points or **M1** for 2 correct products or correct sample space showing at least 3 or for listing pairs that sum to 6
7(b)(i)		**1**	
7(b)(ii)	$A \cap B'$	**1**	
7(b)(iii)	8	**1**	
8(a)	$[BC =]\sqrt{8^2+7^2-2\times8\times7\times\cos 73.4}$	**M2**	or **M1** for $[BC^2]=8^2+7^2-2\times8\times7\times\cos 73.4$ **M1** for 81.[00…]
	9.00[0…]	**A1**	
8(b)	$[\sin ...]=\frac{8\times\sin 73.4}{9}$	**M2**	**M1** for $\frac{8}{\sin BCA}=\frac{9}{\sin 73.4}$ oe
	58.4 or 58.41…	**B1**	
8(c)	26.8 or 26.83…	**2**	**M1** for $\frac{1}{2}\times7\times8\times\sin 73.4$ oe
8(d)	1.64 or 1.641 to 1.642	**3**	**M1** for area sector $BCD=\pi\times9\times9\times\frac{36}{360}$ **M1** for area triangle $BCD=0.5\times9\times9\times\sin 36$
8(e)	29.7 or 29.65 to 29.66 NFWW	**2**	**M1** for $\frac{36}{360}\times2\pi\times9$ oe
9(a)	74 900 or 74 929 to 74 941.1	**3**	**M2** for $\frac{1}{3}\times\pi\times40^2\times\sqrt{60^2-40^2}$ oe or **M1** for 60^2-40^2 [=2000] oe
9(b)	$\pi \times 40^2 + \pi \times 40 \times 60$ $= 4000\pi$ with no errors	**M2**	**M1** for $\pi \times 40^2$ or $\pi \times 40 \times 60$

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Question	Answer	Marks	Partial Marks
9(c)	Ratio areas = 4000π : 1000π implies Ratio sides = 2 : 1 oe	**M1**	
	[*r*=] 40 × 0.5 = 20 oe	**A1**	
	ALTERNATIVE $40\times\sqrt{\frac{1000\pi}{4000\pi}}$ oe = 20 with no errors	**(M2)**	**M1** for $\sqrt{\frac{1000\pi}{4000\pi}}$ or $\sqrt{\frac{4000\pi}{1000\pi}}$ oe or $\left(\frac{40}{x}\right)^2=\frac{4000\pi}{1000\pi}$ oe
9(d)	11 900 or 11 930 to 11 940 or 3800π	**3**	**M2** for $\pi\times40^2+\pi\times20^2+\pi\times60\times40-\pi\times30\times20$ or **M1** for $\pi\times60\times40-\pi\times30\times20$ If 0 scored, **SC1** for 3400π or 10 700 or 10 680 to 10 681.4…
10(a)(i)	12	**3**	**M1** for $y=\frac{k}{\sqrt{x+1}}$ oe **A1** for $k = 36$ OR **M2** for $18\div\sqrt{\frac{8+1}{3+1}}$ oe or **M1** for $\frac{y}{18}=\sqrt{\frac{3+1}{8+1}}$ oe
10(a)(ii)	575	**2**	**M1** for $\sqrt{x+1}=\frac{their\,k}{1.5}$ or better
10(b)	18 NFWW	**3**	**M1** for $18=c\times\sqrt{3+1}$ oe or better **M1** for $wy=their9\sqrt{x+1}\times\frac{their36}{\sqrt{x+1}}$ oe
11(a)	11	**1**	
11(b)	–2	**2**	**M1** for $3x = -7 + 1$
11(c)	$\frac{5-x}{2}$ oe final answer	**2**	**M1** for $x = 5 - 2y$ or $\frac{y}{2}=\frac{5}{2}-x$ or $2x = 5 - y$

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Question	Answer	Marks	Partial Marks
11(d)	$[\text{h}(\text{f}(x))] = \dfrac{1}{2(3x-1)-3}$	**M1**	
	$(5-2x)(6x-5)=7$	**A1**	All further FTs dep on second stage in correct form $(5-2x)(ax+b)=k$ where a, and b are integers or sketch of rectangular hyperbola
	Correct expansion of brackets	**M1**	$30x-25-12x^2+10x$ [= 7] or sketch of straight line with negative gradient
	Correct rearrangement to 3 term quadratic on one side	**M1**	$12x^2-40x+32=0$ oe or graphs intersecting twice in 1st quadrant
	Correct factorisation	**M1**	$(6x-8)(2x-4)=0$ oe or correct use of formula or correct sketch of the quadratic or solutions indicated at points of intersection
	$2,\ \dfrac{4}{3}$ oe	**B1**	Both answers correct

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