GradeMax

Cambridge Assessment International Education

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **February/March 2023**

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

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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.

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.

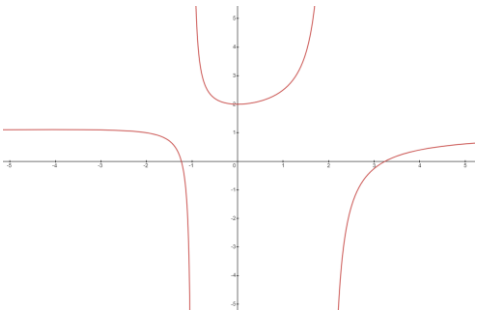
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier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

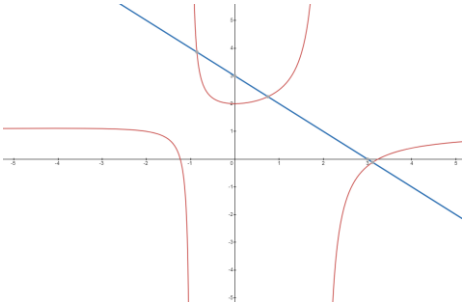
Abbreviations

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)	9	**1**	
1(b)	10	**1**	
1(c)	6	**1**	
1(d)	4	**1**	
1(e)	5.71 or 5.706 to 5.707	**2**	**M1** for attempt at fx/f
2(a)	Translation $\begin{pmatrix}-11\\-13\end{pmatrix}$	**2**	**B1** for each
2(b)	Rotation 90 clockwise oe [Centre] (4, 9)	**3**	**B1** for each
2(c)	Correct triangle (–6, 8) (–6, 7) (–3, 7)	**2**	**B1** for correct reflection in $y = k$,
2(d)	Correct triangle (–6, –6) (–6, –4) (0, –4)	**2**	**B1** for correct SF enlargement, incorrect position
3(a)	Angle in semicircle	**1**	
3(b)(i)	x	**1**	
3(b)(ii)	$2x$ oe	**1**	**FT** 2 × *their* **(i)**
3(b)(iii)	$180 – 2x$ oe	**1**	**FT** 180 – *their* **(ii)**
3(b)(iv)	$90 – x$ oe	**1**	
3(b)(v)	$90 + x$ oe	**1**	**FT** 180 – *their* **(iv)**
3(c)	[y =] $90 – 2x$ oe	**1**	**FT** 90 – *their* **(*b*)(ii)**
4	In parts **(b)**, **(c)** and **(d)**, marks can only be earned with an increasing curve		
4(a)	169.31 or 169 or 169.3	**2**	**M1** for use of mid-points e.g. 24 × 152.5 + 42×157.5 + 84 × 162.5 …
4(b)	[24], 66, 150, 256, 368, 455, [500]	**1**	
4(c)	Correct curve (155, 24) (160, 66) (165, 150) (170, 256) (175, 368) (180, 455) (185, 500)	**3**	**M1** for horizontal plot correct **M1** for at least 5 vertical plots correct
4(d)(i)	175 to 176.5	**1**	**FT** *their* curve

Question	Answer	Marks	Partial Marks
4(d)(ii)	18 to 20	**2**	**B1** for 90 to 100 or **M1** for $\frac{\textit{their } 90}{500}$ [×100] soi
5(a)	7.2 oe	**2**	**M1** for $48 = 3\times4 + 5B$
5(b)	0.5 oe	**3**	**M1** for $6 - 12x$ or $2 + 4x - 4$ **M1** for correctly collecting *their* terms e.g. $-12x - 4x = 2 - 4 - 6$ oe
5(c)	–8.5 oe	**3**	**M1** for eliminating fractions **M1** for expanding brackets and collecting *their* terms **M1** for correctly solving *their* equation of the form $ax = b$ Max 2 marks for incorrect answer
5(d)	0.8 oe	**4**	**B1** for $2 = 2\log 10$ or $\log 100$ **M1** for a correct use of $\log a + \log b = \log ab$ or $\log a - \log b = \log \frac{a}{b}$ **M1** for a correct use of $\log a^b = b \log a$
5(e)	x = –1.72 x = 1.55	**3**	**M2** for sketch indicating correct roots or $x = \frac{-1 \pm \sqrt{1^2 - 4\times6\times(-16)}}{2\times6}$ or **M1** for $6x^2 + x - 16$ [= 0] or reverse signs If 0 scored, **SC1** for one correct answer
6(a)		**4**	**B4** for fully correct curve or **B3** for 'correct' curve with overlaps. or **B2** for 2 sections correct or **B1** for 1 section correct
6(b)	x = –1, x = 2	**2**	**B1** for each
6(c)	(0, 2)	**1**	

Question	Answer	Marks	Partial Marks
6(d)		**1**	Must intersect curve 3 times
6(e)(i)	$x = –0.861$ or $–0.8608…$ $x = 0.746$ or $0.7458…$ $x = 3.11$ or 3.114 to 3.115	**2**	**B1** for one correct If 0 scored **SC1** for –0.86, 0.75, 3.1
6(e)(ii)	$–1 < x < –0.861$ $0.746 < x < 2$ $x > 3.11$	**3**	**FT** *their* **(i)** **B1** for each
7(a)	$y = \frac{20}{\sqrt[3]{x}}$	**3**	**M1** for $y = \frac{k}{\sqrt[3]{x}}$ **B1** for $k = 10 \times \sqrt[3]{8}$
7(b)	15.625 oe	**2**	**M1** for $\sqrt[3]{x} = \frac{their\ 20}{8}$ or **M1** for $10 \times \sqrt[3]{8} = 8 \times \sqrt[3]{x}$ oe
7(c)	$w = 800x^{-\frac{2}{3}}$ cao	**4**	**B2** for $w = 2y^2$ or **B1** for $w = ky^2$ and **M1** for $w = their\ k\left(their\left(\frac{20}{\sqrt[3]{x}}\right)\right)^2$
8(a)	40.7 or 40.69…	**3**	**M2** for $55^2 – 37^2$ oe soi by 1656 or **M1** for $55^2 = AB^2 + 37^2$ oe
8(b)	125.7 or 126 or 125.7…	**3**	**M2** for $[\sin ACD =] \frac{64 \times \sin 28}{37}$ or **M1** for $\frac{64}{\sin ACD} = \frac{37}{\sin 28}$ oe
8(c)(i)	116 or 116.2 to 116.3	**2**	**M1** for $180 – 28 –$ *their***(b)** soi by 26.29 or 26.3
8(c)(ii)	296 or 296.2 to 296.3	**1**	**FT** 180 + *their* **(c)(i)**
8(d)	1280 or 1277 to 1278	**3**	**M1** for $0.5 \times$ *their***(a)** $\times 37$ **M1** for $0.5 \times 64 \times 37 \times \sin(180 – 28 –$ *their***(b)**$)$
9(a)(i)	5737.62	**2**	**M1** for 5000×1.035^4 oe

Question	Answer	Marks	Partial Marks
9(a)(ii)	14	**4**	**B3** for 13.6 to 13.7 OR **M3** for $n\log 1.035 = \log\frac{8000}{5000}$ oe or good sketch indicating value between 13 and 14 or correct trials reaching 13 and 14 or **M2** for $1.035^n = \frac{8000}{5000}$ oe or exponential sketch or at least 3 correct trials with $n > 4$ or **M1** for $5000 \times 1.035^n = 8000$ oe or at least 2 correct trials If 0 scored, **SC3** for answer 2 coming from use of 1.35
9(b)(i)	5800	**3**	**M2** for $5000 + \frac{5000\times 4\times 4}{100}$ oe or **M1** for $\frac{5000\times 4\times 4}{100}$ oe
9(b)(ii)	15	**2**	**M1** for $5000 + \frac{5000\times 4\times n}{100} = 8000$ oe
9(c)	9	**4**	**B3** for 8.556… or 8.56 OR **M1** for $5000\times 1.035^n = 5000(1+0.04n)$ oe soi **M1** for sketch of 1.035^n **M1** for sketch of $1+0.04n$
10(a)	$\tan 63 = \frac{x}{BC}$ or $BC = \frac{x}{\tan 63}$	**B1**	
	$AB = 480\times\frac{1000}{3600}\times 18$ oe	**M1**	
	$AB = 2400$ $AC = \frac{x}{\tan 63} + 2400$	**A1**	

Question	Answer	Marks	Partial Marks
10(b)	1750 or 1750.[…]	**5**	**M4** for $\frac{2400\tan 28}{\left(1-\frac{\tan 28}{\tan 63}\right)}$ oe or **M3** for $x\frac{\tan 28}{\tan 63}+2400\tan 28=x$ oe or **M2** for $\tan 28=\frac{x}{\left(\frac{x}{\tan 63}+2400\right)}$ oe or **M1** for $\tan 28=\frac{x}{AC}$ OR **M2** for $BD=\frac{2400\sin 28}{\sin 35}$ or **M1** for $\frac{BD}{\sin 28}=\frac{2400}{\sin 35}$ **M2** for $x = theirBD\sin 63$ or **M1** for $\sin 63 = \frac{x}{theirBD}$

Question	Answer	Marks	Partial Marks
11(a)(i)	Fully correct method for area	**M3**	e.g. [Area] $= \frac{1}{2} \times \left(2 \times \frac{\sqrt{3}r}{2}\right)^2 \sin 60$ or Area of $BOC = \frac{1}{2}r^2 \times \sin 120$ $= \frac{1}{2}r^2 \times \frac{\sqrt{3}}{2}$ Area of $ABC = 3 \times \frac{1}{2}r^2 \times \frac{\sqrt{3}}{2}$ or Side by cosine rule = $r\sqrt{3}$ Then $0.5 \times a^2 \times \sin 60$ or $\frac{\sqrt{3}}{4}(side)^2 = \frac{\sqrt{3}}{4}(r\sqrt{3})^2$ $= \frac{3\sqrt{3}}{4}r^2$ or **M2** for correct method length of side or **M1 for** $\cos 30 = \frac{\sqrt{3}}{2}$ oe
	Completion to answer with no errors	**A1**	
11(a)(ii)	$\pi r^2 - \frac{3\sqrt{3}}{4}r^2$ oe	**1**	
11(b)	[Area =] $3\sqrt{3}r^2 - \pi r^2$ oe	**3**	**M2** for $0.5 \times \left(\frac{2r}{\tan 30}\right)^2 \times \sin 60$ oe or **M1** for $EF = \frac{2r}{\tan 30}$ oe
11(c)	1 : 2	**2**	**B1** for unsimplified
12(a)(i)	$\frac{x^2}{(x+y+z)^2}$ oe final answer	**2**	**M1** for $\frac{x}{(x+y+z)}$
12(a)(ii)	$\frac{2yz}{(x+y+z)^2}$ oe final answer	**2**	**M1** for $\frac{y}{x+y+z} \times \frac{z}{x+y+z}$

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Question	Answer	Marks	Partial Marks
12(b)	$\frac{7}{13}$	**3**	**M2** for $\frac{x}{x+y}=\frac{7}{20}$ oe soi or **M1** for $\frac{x^2}{(x+y)^2}=\frac{49}{400}$

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