Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS **0580/23**

Paper 2 (Extended) **May/June 2022**

MARK SCHEME

Maximum Mark: 70

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.

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This document consists of **8** printed pages.

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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.

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ABBREVIATIONS IN MARK SCHEME

Abbreviation	Meaning
M	Method marks - for a correct method applied to appropriate numbers.
A	Accuracy marks – depend on M marks. Hence M0 A1 is not possible.
B	Independent of method marks – for a correct final answer, a partially correct answer or a correct intermediate stage.
SC	Marks given in special cases only when indicated in mark scheme.
FT	Work can be followed through after an error.
isw	Ignore subsequent working (after correct answer obtained)
cao	Correct answer only
nfww	Not from wrong working
oe	Or equivalent
soi	Seen or implied
eeo	Each error or omission
dep	Dependent on the previous mark(s)

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Question	Answer	Marks	Partial Marks
1	0.95 oe	**1**	
2	792 or 792.1…	**2**	**M1** for $\frac{4\times7^3}{\sqrt{3}}$ oe or **B1** for 1372
3	97	**2**	**M1** for 360 – (73 + 129 + 75)
4(a)	0 | (3 4) 7 8 1 | 1 1 2 2 7 8 2 | 1 3	**2**	**B1** for two rows correct or for fully correct unordered stem-and-leaf diagram or for a correct diagram with one error or omission
4(b)	1.15	**1**	
5	0, 3, 8	**2**	**B1** for 2 correct terms in correct position or **SC1** for −1, 0, 3
6(a)	y^{-2} or $\frac{1}{y^2}$ final answer	**1**	
6(b)	7	**1**	
7(a)	27 000	**1**	
7(b)	Point plotted at (175, 9)	**1**	
7(c)	Correct single ruled line of best fit	**1**	
7(d)	300 to 350	**1**	**FT** *their* straight line of best fit provided positive gradient
8	$\frac{2}{9}\times\frac{6}{5}$ or $\frac{4}{18}\div\frac{15}{18}$ oe	**M1**	
	$\frac{4}{15}$ cao	**A1**	
9	18	**2**	**M1** for $\frac{300\times60}{1000}$ oe or **B1** for figs 18 in *their* answer
10	40	**1**	
11	*DE*	**1**	

Question	Answer	Marks	Partial Marks
12	0.14 oe nfww	**4**	**M3** for $\frac{14}{50 \times 2}$ with at least 2 out of 3 values correct and for the **one** incorrect value: f must be 1, 2 or 7 m must be a multiple of 50 p must be prime OR **B1** for $f = 14$ **B1** for $m = 50$ **B1** for $p = 2$ If **0** scored **SC1** for a correct multiple for m, factor for f or prime for p
13(a)	$9p(2x - 3)$ final answer	**2**	**B1** for $9(2px - 3p)$ or $p(18x - 27)$ or $3p(6x - 9)$ or $9p(2x - 3)$ seen and spoilt
13(b)	$(m + n)(t - 1)$ final answer	**2**	**B1** for $m(t - 1) + n(t - 1)$ or $t(m + n) - [1](m + n)$ or correct answer seen and spoilt
14	$3n^2 + 5$ oe final answer	**2**	**M1** for correctly finding second differences or an answer that is a quadratic sequence
15	$x \geqslant 2$ final answer	**2**	**M1** for $12x - 4x \geq 13 + 3$ oe
16	D B C	**B1**	
	$\frac{1}{3}$ or 0.333…	**B1**	
	150	**B2**	or **M1** for $\frac{1}{2} \times 30 \times 10$
17	*ADC* and *ADB* and 90 *AD* RHS	**3**	**B1** for each correct line

Question	Answer	Marks	Partial Marks
18	252	**3**	**M2** for 180 ÷ (7 – 2) oe OR **M1** for $180 - x + y = 360$ oe **M1** for correct use of ratio
19(a)	3	**2**	**M1** for $k(-5k)^2 = 675$ or better
19(b)	$\frac{5}{7x-2}$ final answer	**1**	
19(c)	$\frac{1}{2}$ or 0.5	**4**	**B3** for answer $\frac{7}{14}$ OR **B2** for $\frac{5x+2}{7}$ or **M1** for correct first step for $h^{-1}(x)$ e.g. $x = \frac{7y-2}{5}$ $5y = 7x - 2$ $y + \frac{2}{5} = \frac{7x}{5}$ **M1FT** for $\frac{2(5x+2)}{14} + \frac{3-10x}{14}$ oe with common denominator
20	90.2 or 90.18…	**4**	**B3** for 9.82[%] OR **M3** for $[100\times]\left(k^2 - \frac{45}{360} \times \pi \times \left(\frac{k}{2}\right)^2\right) \div k^2$ oe or **M2** for $[100\times]\frac{45}{360} \times \pi \times \left(\frac{k}{2}\right)^2 \div k^2$ oe or $k^2 - \frac{45}{360} \times \pi \times \left(\frac{k}{2}\right)^2$ or $100\times (k^2 - m\pi k^2) \div k^2$ or **M1** for $\frac{c}{360} \times \pi \times \left(\frac{k}{2}\right)^2$ oe or for $(k^2 - m\pi k^2) \div k^2$ or for $100\times (k^2 - mk^2) \div k^2$

Question	Answer	Marks	Partial Marks
21	13.75 14.85	**3**	**B2** for one correct answer or both correct answers seen in working then rounded to 3sf or both correct but reversed or **M1** for 2 correct seen from 23 + 0.5, 23 – 0.5, 8.7 + 0.05 or 8.7 – 0.05 or better
22	$\frac{x}{5+x}$ final answer nfww	**3**	**B1** for $x(5-x)$ **B1** for $(5-x)(5+x)$ or
23	221.8 or 221.81... and 318.2 or 318.18 to 318.19	**3**	**B2** for one correct or **M1** for $\sin x = -\frac{2}{3}$ oe If **0** scored, **SC1** for two reflex angles with a sum of 540 or two non-reflex angles with a sum of 180
24	2.8	**3**	**M1** for $y = \frac{k}{(x-1)^3}$ **M1** for $y = \frac{their\ k}{(4-1)^3}$ OR **M2** for $y(4-1)^3 = 9.45(3-1)^3$
25	81	**3**	**M2** for $m^{\frac{3}{4}} = 27$ or better or **M1** for $\frac{1}{m^{\frac{1}{4}}} = \frac{27}{m}$ or better or $m^{-\frac{1}{4}---1} = 27$ If **0** scored **SC1** for answer $\frac{1}{81}$

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