Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS (US) **0444/23**

Paper 2 (Extended) **October/November 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.

Cambridge International is publishing the mark schemes for the October/November 2022 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 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.

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.

Question	Answer	Marks	Partial Marks
1	5[h] 23[min]	**1**	
2(a)	121	**1**	
2(b)	149	**1**	
3	0.003	**1**	
4	95 101 101 103	**3**	**M1** for 4×100 implied by 400 or for four numbers which add to 400 **B1** for four numbers with a range of 8 **B1** for four numbers with mode of 101 to a maximum of **2** marks
5	$\frac{1}{21}$ cao	**2**	**M1** for $\frac{15}{21} - \frac{14}{21}$ oe Allow any correct common denominator $21k$
6(a)	0.35 or 35% or $\frac{7}{20}$ oe	**2**	**M1** for $1 - (0.4 + 0.25)$ oe
6(b)	48	**1**	
7	180	**2**	**M1** for answer $2 \times 2 \times 3 \times 3 \times 5$ or better or for answer $180k$ or two correct factor trees, tables or Venn diagram or better or a list of multiples of both 36 and 60 with at least the first three correct of each
8	(1, 3.5)	**2**	**B1** for each
9	[x =] 9 [y =] 3 oe	**2**	**B1** for each answer
10	Correct circle with 2 perpendicular bisectors with construction arcs	**4**	**B3** for two correct perpendicular bisectors with arcs **B2** for one correct perp bisector with arcs or two correct bisectors without arcs **B1** for drawing correct circle without arcs or one correct perp. bisector without arcs
11	18	**4**	**B2** for $x = 12$ **s**oi or **M1** for $7x + 76 + x + 8 = 180$ or better **M1** for $360 \div$ (*their* $x + 8$) oe

Question	Answer	Marks	Partial Marks
12	410	**3**	**M1** for $\frac{5}{100}\times 4000$ oe or better **M1** for $\frac{5}{100}\times(4000+\textit{their}\ 200)$ oe or better
13	$16\sqrt{3}$	**2**	**B1** for $5\sqrt{3}$ or $11\sqrt{3}$
14	52	**2**	**M1** for answer figs 52
15(a)	1	**1**	
15(b)	$[-]\frac{3}{2}$ oe	**2**	**M1** for $\frac{5-8}{10-8}$ oe
15(c)	–0.8 to –0.6 with correct ruled tangent at (8, 8)	**2**	**M1** for ruled tangent at (8, 8)
16	$y=-\frac{1}{2}x+9$ oe	**3**	**M1** for grad $=-\frac{1}{2}$ oe soi **M1** for correct substitution shown of (4, 7) into $y = (\textit{their}\ m)x + b$ oe ($\textit{their}\ m \neq 2$)
17	8	**3**	**M1** for $y=k(x-7)^2$ oe **M1** for $[y=]\textit{their}\ k(17-7)^2$
18	12	**3**	**M2** for $9\times\sqrt[3]{\frac{640}{270}}$ oe or **M1** for $\sqrt[3]{\frac{640}{270}}$ oe or $\sqrt[3]{\frac{270}{640}}$ oe seen or for $\frac{9^3}{x^3}=\frac{270}{640}$ oe
19(a)	$\frac{2}{x-1}$ final answer	**2**	**M1** for $\frac{10}{5x-3-2}$ or better
19(b)	$\frac{10}{x}+2$ or $\frac{10+2x}{x}$ final answer	**3**	**M2** for $y-2=\frac{10}{x}$ or $x=\frac{10+2y}{y}$ oe or $yx = 10 + 2x$ oe or **M1** for $x=\frac{10}{y-2}$ or $y(x – 2) = 10$ oe or better
19(c)	$x – 1$ final answer	**1**	

Question	Answer	Marks	Partial Marks
20(a)	120	**2**	**M1** for 120 seen vertically opposite to the 72 and 48 or for 48 + 72 only or for 72 and 48 correctly indicated on the top parallel line or marking the opposite angle to x 'x'
20(b)	[u =] 48 [v =] 75 [w =] 57	**3**	**B1** for each
21(a)(i)	205	**1**	
21(a)(ii)	300	**2**	**B1** for [C =] 30
21(b)	$\frac{4}{5}$ oe	**2**	**M1** for $\frac{5}{\sin 30} = \frac{8}{\sin x}$ oe or $\sin 30 = \frac{1}{2}$ soi
22(a)	$x^2 - 4x + 1$ final answer	**3**	**B1** for $3x^2 + x - 6x - 2$ or better **B1** for $2x^2 - 3x + 2x - 3$ or better
22(b)	$\frac{2}{x}$ final answer	**4**	**M1** for $\left[\frac{4}{2x-3}\right] \times \frac{2x^2 + 11x - 21}{2x^2 + 14x}$ oe soi **B1** for $(x + 7)(2x - 3)$ **B1** for $2x(x + 7)$