GradeMax

Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS **0580/31**

Paper 3 Core **October/November 2022**

MARK SCHEME

Maximum Mark: 104

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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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
cao – correct answer only
dep – dependent
FT – follow through after error
isw – ignore subsequent working
oe – or equivalent
SC – Special Case
nfww – not from wrong working
soi – seen or implied

Question	Answer	Marks	Partial Marks
1(a)	9.9[0] 3.9[0]	**2**	**B1** for each
	17.4[0]	**1**	**FT** *their* table
1(b)	25.04	**2**	**M1** for $50 - (8 \times 3.12)$ or **B1** for 24.96
1(c)	$\frac{30}{2} \times (5 + 3 + 2)$	**2**	**M1** for $\frac{30}{2}$ or $\frac{5+3+2}{2}$
1(d)(i)	16	**2**	**M1** for 6×4 soi by 24
1(d)(ii)	3	**3**	**M2** for $2(6 \times 15 + 4 \times 15)$ oe or $2(6 \times 0.15 + 4 \times 0.15)$ oe or **M1** for 6×15 or 4×15 oe or 6×0.15 or 4×0.15 oe or $2 \times (6 + 4)$ oe
2(a)(i)	Rotation 180° (0, 0)	**3**	**B1** for each
2(a)(ii)	Enlargement 0.5 oe (–1, 1)	**3**	**B1** for each
2(b)(i)	Shape drawn at (3, –1), (5, –1), (3, –5)	**2**	**B1** for reflection in $x = 0$ or $y = k$
2(b)(ii)	Shape drawn at (–4, 2), (–2, 2), (–4, 6)	**2**	**B1** for a translation by $\begin{pmatrix} -7 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 1 \end{pmatrix}$
3(a)(i)	08 25	**1**	
3(a)(ii)	$57 \times \frac{40}{60}$ [= 38]	**2**	**M1** for $\frac{40}{60}$ or 57×40
3(b)	$56w + 21p$ final answer	**2**	**B1** for $56w$ or $21p$ in final answer or for $56w + 21p$ seen then spoilt

Question	Answer	Marks	Partial Marks
3(c)	928	**3**	**M2** for [2 ×](20 × 12 + 20 × 7 + 12 × 7) oe or **M1** for (20 × 12) or (20 × 7) or (12 × 7)
3(d)(i)	2 4 5 6 2 1	**2**	**B1** for 4 or 5 correct frequencies If **0** scored **SC1** for correct tallies if frequency column blank or all frequencies correct but not in the frequency column
3(d)(ii)	Suitable scales on *y*-axis	**1**	
	Bars at correct height	**1**	**FT** *their* frequency
	Bars equal width	**1**	
3(d)(iii)	16 – 20	**1**	**FT** *their* bar chart
4(a)(i)	72 or 75 or 78	**1**	
4(a)(ii)	7 or 9	**1**	
4(a)(iii)	64	**1**	
4(a)(iv)	$\frac{1}{7}$ or 0.143 or 0.142[8..]	**1**	
4(b)	24	**1**	
4(c)(i)	15	**1**	
4(c)(ii)	1	**1**	
4(d)	6 nfww	**2**	**M1** for $\frac{(461.5 - 17.5)}{74}$ oe
4(e)	11 45	**3**	**B2** for 225 or 3 hr 45 mins or **M1** for 225*k* or 3 × 3 × 5 × 5 or [25 =] 5 × 5 and [45 =] 3 × 3 × 5 or two correct factor trees/tables of both 25 and 45 OR **M2** for listing times/multiples of both 25 and 45 to at least 11 45 or 225 or **M1** for listing at least 3 consecutive times/multiples of each correctly or one full list
5(a)(i)	7 nfww	**1**	

Question	Answer	Marks	Partial Marks
5(a)(ii)	3.43 or $3\frac{13}{30}$	**3**	**M1** for [0 × 3] + 1 × 6 + 2 × 12 + 3 × 8 + 4 × 14 + 5 × 10 + 6 × 3 + 7 × 4 **M1 dep** for *their* 206 ÷ 60
5(a)(iii)	$\frac{17}{60}$	**2**	**M1** for $\frac{10+3+4}{60}$ or **B1** for 17
5(b)(i)	95.5 96.5	**2**	**B1** for each If 0 scored, **SC1** for both correct but reversed
5(b)(ii)	968	**5**	**B4** for 969 or 968.6 to 968.8 as final answer OR **M3** for $\frac{140\,000}{46\pi}$ oe or **M2** for $\frac{\textit{figs } 1400}{\textit{figs } 46\pi}$ oe or **M1** for *figs* 46 × π oe or 2 × *figs* 23 × π oe **B1** for correctly truncating answer to integer
6(a)	Cylinder	**1**	
6(b)	28	**2**	**M1** for 180 – 104 oe
6(c)	156	**2**	**M1** for $180 - \frac{360}{15}$ oe or $\frac{(15-2)180}{15}$ oe
6(d)(i)	Chord	**1**	
6(d)(ii)	Tangent drawn at point *B*	**1**	
6(d)(iii)	17.7 or 17.67 to 17.68	**3**	**M2** for [2×] $\sqrt{245.5 \div \pi}$ oe or **M1** for 245.5 ÷ π oe
6(d)(iv)	52	**2**	**M1** for 180 – 90 – 38 oe or **B1** for [angle *ACB* =] 90 correctly identified

Question	Answer	Marks	Partial Marks
7(a)	$-2g + 3h$ final answer	**2**	**B1** for $-2g$ or $3h$ in final answer or $-2g+ 3h$ seen then spoilt
7(b)	22	**2**	**M1** for $4 \times -5 + 7 \times 6$ or **B1** for -20 or [+]42
7(c)	$7x(2x^2 + 7)$ final answer	**2**	**B1** for $7(2x^3 + 7x)$ or $x(14x^2 + 49)$ or correct answer seen then spoilt
7(d)	7.5	**3**	**M1** for a first correct step $24t - 72 = 108$ or $3t - 9 = 13.5$ **M1FT** for a second correct step e.g. $24t = 180$ or $3t = 22.5$
7(e)(i)	19	**1**	
7(e)(ii)	8	**1**	
7(f)	$x + 3x + 3x + 4 = 46$ or $7x + 4 = 46$ leading to $x = 6$	**4**	**M2** for a correct equation which would lead to $7x + 4 = 46$ or **B1** for $3x$ or $3x + 4$ seen **M1** for $7x = 42$ or for rearranging *their* equation to $ax = b$ **B1** for [$x =$] 6
8(a)(i)	$\begin{pmatrix} -12 \\ 20 \end{pmatrix}$	**1**	
8(a)(ii)	$\begin{pmatrix} -13 \\ 14 \end{pmatrix}$	**2**	**B1** for $\begin{pmatrix} -13 \\ j \end{pmatrix}$ or $\begin{pmatrix} k \\ 14 \end{pmatrix}$
8(b)(i)	(3, 1)	**1**	
8(b)(ii)	Q plotted at (–4, 2)	**1**	
8(b)(iii)	R plotted at (1, 2)	**1**	
8(b)(iv)	Line $y = 3$ drawn	**1**	
8(c)(i)	[$y =$] $2x - 3$	**2**	**B1** for $2x + c$ or $mx - 3$ ($m \neq 0$ or 2)
8(c)(ii)	$y = 2x + k$	**1**	**FT** *their* gradient (not zero) with different intercept than in **(c)(i)**
9(a)(i)	$2250 + 437.5 \times 36$ [= 18 000]	**2**	**M1** for 437.5×36

Question	Answer	Marks	Partial Marks
9(a)(ii)	24	**2**	**M1** for $\frac{18000-13680}{18000}[\times 100]$ oe or $1-\left(\frac{13680}{18000}\right)[\times 100]$ oe or $[100-]\frac{13680}{18000}\times 100$ oe
9(b)	14200 or 14190 or 14190.5 or 14190.47…	**2**	**M1** for $12750\left(1+\frac{1.8}{100}\right)^6$ oe