Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/21**

Paper 2 (Extended) **October/November 2019**

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 2019 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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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	1.25	**1**	
2	$p(5+t)$ final answer	**1**	
3	4.6 cao nfww	**2**	**B1** for 4.57 or 4.58 or 4.579 to 4.580 If 0 scored, **SC1** for their calculation rounded to 2 sf if more than 2sf seen
4(a)	Fifteen thousand [and] sixty	**1**	
4(b)	$1.506[0] \times 10^4$	**1**	
5	$3c - 4d$ final answer	**2**	**B1** for $3c + kd$ or $kc - 4d$
6	11	**2**	**M1** for $x - 2 = 3 \times 3$ oe or $\frac{x}{3} = 3 + \frac{2}{3}$ oe or better
7	$6x^5$ final answer	**2**	**B1** for kx^5 or $6x^k$
8	$\frac{5}{16} \times \frac{8}{7}$	**M1**	
	$\frac{5}{14}$ cao	**A1**	
9	1.5	**2**	**M1** for $\frac{600 \times r \times 10}{100} = 90$ oe or better
10	$\frac{16}{x^4}$ or $16x^{-4}$	**2**	**M1** for $\left(\frac{x}{2}\right)^{-4}$ or $\left(\frac{8}{x^3}\right)^{\frac{4}{3}}$ or $\left(\frac{x^{12}}{4096}\right)^{-\frac{1}{3}}$ or better or **B1** for $\frac{16}{x^k}$ or $16x^k$ or $\frac{k}{x^4}$ or kx^{-4} final answer
11	$\frac{P}{2+\pi}$	**2**	**M1** for $P = r(2+\pi)$
12	229.5225 final answer cao	**2**	**M1** for $(15.1 + 0.05)^2$ or **B1** for 15.15 seen

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Question	Answer	Marks	Partial Marks
13	45[.0] or 44.99 to 45.00	**2**	**M1** for $\frac{1}{2}\times 13\times 11\times \sin 39$ oe
14	49 000	**3**	**M1** for $4.9\times(10\,000\,000)^2$ **M1** for $\div(100\,000)^2$ OR **M1** for 1 cm : 100 km **M1** for $4.9\times(\textit{their}\ 100)^2$ OR **M2** for $(\sqrt{4.9}\times 10\,000\,000\div 100\,000)^2$ or **M1** for $\sqrt{4.9}\times 10\,000\,000\div 100\,000$
15	128	**3**	**M1** for $y=\frac{k}{x^2}$ **M1** for $y=\frac{\textit{their}\ k}{\left(\frac{1}{2}\right)^2}$ OR **M2** for $\frac{2\times 4^2}{\left(\frac{1}{2}\right)^2}$ or **M1** for $2\times 4^2=y\times\left(\frac{1}{2}\right)^2$
16	109.3 or 109.26 to 109.27	**3**	**M2** for $\frac{12\sin 39}{8}$ or **M1** for $\frac{8}{\sin 39}=\frac{12}{\sin(...)}$ oe
17	6.28 or 6.283 to 6.284	**3**	**M2** for $\frac{45}{360}\times\pi\times 5^2$ oe **and** $\frac{45}{360}\times\pi\times 3^2$ oe or **M1** for $\frac{45}{360}\times\pi\times 5^2$ oe or $\frac{45}{360}\times\pi\times 3^2$ oe or $\pi\times 5^2-\pi\times 3^2$ oe
18	$\frac{x^2-3x-8}{2(x+1)}$ or $\frac{x^2-3x-8}{2x+2}$ final answer	**3**	**B1** for common denominator $2(x+1)$ or $2x+2$ **M1** for $x(x+1)-2(2x+4)$ or better
19(a)	$\begin{pmatrix}19 & 22\\ 43 & 50\end{pmatrix}$	**2**	**B1** for 2 or 3 elements correct

Question	Answer	Marks	Partial Marks
19(b)	–2 final answer	**1**	
20	$\frac{147}{160}$ oe	**3**	**M2** for $\frac{1}{10}\times\frac{3}{4}+\frac{9}{10}\times\frac{15}{16}$ or **M1** for $\frac{1}{10}\times\frac{3}{4}$ or $\frac{9}{10}\times\frac{15}{16}$
21(a)	Translation $\begin{pmatrix}-1\\-5\end{pmatrix}$	**2**	**B1** for each
21(b)	Correct reflection at (6, 2), (6, 6), (7, 6), (7, 3)	**2**	**B1** for three correct vertices
22	2592	**4**	**M3** for $1.2\times100\times60\times60\times6\div1000$ oe or **M2** for $1.2\times60\times60\times6$ oe or **M1** for figs $12\times$ figs 6 or 60×60 or correct conversion e.g. their value in $cm^3\div1000$ their value in $m^3\times1000$ 1.2×100 $6\div10\,000$
23	2, 5 3 *A*.....*B′* $\subset$	**4**	**B1** for each
24(a)	19	**2**	**M1** for $3\left(2^x\right)-5$ soi or for f(8)
24(b)	$\frac{x+5}{3}$ oe final answer	**2**	**M1** for correct first step $y+5=3x$ or $\frac{y}{3}=x-\frac{5}{3}$ or $x=3y-5$
25(a)	$-\frac{1}{3}\mathbf{q}+\frac{1}{2}\mathbf{p}$ oe	**2**	**M1** for correct unsimplified answer or correct route
25(b)	$\frac{1}{2}\mathbf{p}+\frac{1}{2}\mathbf{q}$ oe	**2**	**M1** for correct unsimplified answer or correct route

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Question	Answer	Marks	Partial Marks
26	380	**5**	**B2** for time = 8, implied by 23 on t-axis or **M1** for $\frac{20}{t} = 2.5$ or $\frac{20}{t-15} = 2.5$ or $\frac{0-20}{t-15} = -2.5$ oe **M2** for $\frac{1}{2}$(*their* 23 + 15) × 20 or $20 \times 15 + \frac{1}{2} \times$ *their* 8×20 oe or **M1** for any relevant area found

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