Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/22**

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).

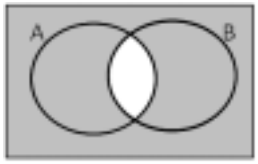
GENERIC MARKING PRINCIPLE 6:

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	6.8	**1**	
2	7.6[0] or 7.604 to 7.605	**1**	
3	$a^4 + 3a$ final answer	**1**	
4		**1**	
5(a)	23	**1**	
5(b)	One extreme value oe	**1**	
6	135	**2**	**M1** for $\frac{12}{12+7+9+4}[\times 360]$ or $\frac{360}{12+7+9+4}[\times 12]$ oe
7	440 or 440.2 to 440.3	**2**	**M1** for $30\,000 \div 68.14$
8	282	**2**	**M1** for $180 + 102$ or $360 - (180 - 102)$
9	$x < -10$ final answer	**2**	**M1** for $-12 - 13 > 3x - \frac{x}{2}$ oe
10	$67.\dot{7} - 6.\dot{7}$ oe	**M1**	
	$\frac{61}{90}$	**A1**	If 0 scored, **SC1** for $\frac{k}{90}$

Question	Answer		Marks	Partial Marks
11	$\frac{29}{8}$ or $\frac{5}{3}$	$2\frac{5}{8}-\frac{2}{3}$	**M1**	Allow $\frac{29k}{8k}$ or $\frac{5k}{3k}$ Correct step for dealing with mixed numbers
	$\frac{87}{24}$ and $\frac{40}{24}$	$[2]\frac{15}{24}$ and $\frac{16}{24}$	**M1**	Correct method to find common denominator e.g. $3\frac{15}{24}$ and $1\frac{16}{24}$
	$1\frac{23}{24}$ cao		**A1**	
12	90		**3**	**M2** for $360 \div (180 - 176)$ oe or **M1** for $180(n - 2) = 176n$ oe or $180 - 176$
13	352		**3**	**B2** for figs 352 or **M1** for $\left(\frac{75}{30}\right)^3$ oe or $\left(\frac{30}{75}\right)^3$ oe OR **M2** for $5.5\times\left(\frac{30}{75}\right)^3\times 1000$
14	Gradient = $\frac{5}{4}$ oe		**M1**	**M** marks can be in any order
	$y = k-\frac{4}{5}x$ oe and gradient = $-\frac{4}{5}$ oe		**M1**	
	Use of product of gradients is −1 oe		**M1**	
15(a)	$2.45x + 3.15y$ final answer		**2**	**B1** for one correct term in final answer If 0 scored, **SC1** for $245x + 315y$
15(b)	13		**2**	**M1** for $60.55 - 2.45 \times 8$ oe
16	$y = 5$ ruled $y = x + 1$ ruled Correct region indicated		**4**	**B2** for two correct lines or **B1** for one correct line **B2** for indication of correct region or **B1** for shading that satisfies two of the inequalities

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Question	Answer	Marks	Partial Marks
17	Bisector of angle Q accurate with two pairs of correct arcs and Arc centre R, radius 6.5 cm With bird table correctly indicated or implied by correct intersecting constructions	**4**	**M2** for bisector of angle Q accurate with two pairs of correct arcs or **M1** for accurate bisector with no/wrong arcs **M2** for arc centre R, radius 6.5 cm or **M1** for arc centre R Maximum 3 marks if incorrect position/region is labelled, or there is no label and a region is shaded, or *their* constructions do not intersect
18(a)	0.3 oe	**2**	**M1** for 0.4×0.75
18(b)	0.975 oe	**2**	**M1** for $1 - 0.4 \times 0.25 \times 0.25$ oe or $0.6 + 0.4 \times 0.75 + 0.4 \times 0.25 \times 0.75$ or 0.6 + *their* **(a)** $+ 0.4 \times 0.25 \times 0.75$
19(a)	$180 - 4x$	**1**	
19(b)	$90 - 2x$	**1**	**FT** *their* **(a)** ÷ 2 in its simplest form dep on expression in x in **(a)**
19(c)	$90 + x$	**2**	**FT** $180 -$ *their* **(b)** $- x$ oe dep on expression in x in **(b)** then fully simplified **M1** for $180 - (90 - 2x + x)$ oe or $180 -$ *their* **(b)** $- x$ oe dep on expression in x in **(b)**
20(a)	$(3y + 2x)(6 - a)$ oe final answer	**2**	**M1** for $3y(6 - a) + 2x(6 - a)$ oe or $6(2x + 3y) - a(2x + 3y)$ oe
20(b)	$3(x + 4y)(x - 4y)$ final answer	**3**	**M2** for $(3x + 12y)(x - 4y)$ or $(3x - 12y)(x + 4y)$ or **M1** for $3(x^2 - 16y^2)$ or for $(x + 4y)(x - 4y)$
21(a)	6	**2**	**B1** for 3^4 or 3^{x-2} or **M1** for $3^x = 81 \times 3^2$ or better
21(b)	8	**3**	**M2** for $x^{\frac{5}{3}} = 32$ or better or **M1** for $\frac{1}{x^{\frac{1}{3}}} = \frac{32}{x^2}$ or better or $x^{-\frac{1}{3}--2} = 32$ or better
22(a)	$\begin{pmatrix} 2 & 17 \\ 10 & -25 \end{pmatrix}$	**2**	**B1** for 2 correct elements

Question	Answer	Marks	Partial Marks
22(b)	2	**2**	**M1** for $-3 - 5k = -13$ oe
22(c)	$\frac{1}{10}\begin{pmatrix} 0 & -2 \\ 5 & 3 \end{pmatrix}$ oe isw	**2**	**M1** for $k\begin{pmatrix} 0 & -2 \\ 5 & 3 \end{pmatrix}$ or for det = 10 or soi
23(a)	Tangent ruled at $t = 24$	**B1**	
	-0.7 to -0.3	**B2**	**B2** dep on correct tangent or close attempt at tangent **M1** for rise/run **also dep on** correct tangent drawn or close attempt at tangent. Must see correct or implied calculation from a drawn tangent.
23(b)	acceleration or deceleration oe	**1**	
23(c)	68	**2**	**M1** for $(22 - 5) \times 4$

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