Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2019**

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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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)(i)	Correct bar	**1**	
1(a)(ii)	December	**1**	
1(a)(iii)	82	**1**	
1(a)(iv)	16.4	**1**	**FT** *their* **(a)(iii)**÷5
1(b)(i)	28.3[0]	**2**	**M1** for 15.3 + (2 × 6.5) oe
1(b)(ii)	2.5[0]	**2**	**M1** for [10 –](2 × 3.75) oe
1(b)(iii)	85.7	**1**	
1(b)(iv)	1645	**1**	
1(b)(v)	55	**3**	**B1** for 72 or 1.2 seen **M1** for 66 ÷ *their* time
2(a)(i)	Chord correctly drawn	**1**	
2(a)(ii)	Angle [in a] semicircle [is 90º]	**1**	
2(b)	384	**2**	**M1** for 8 × 8[× 6]
2(c)(i)	40	**2**	**M1** for 5 × 4 × 2
	cm^3	**1**	
2(c)(ii)	Correct net	**3**	**B2** for 4 more correct faces in correct position **B1** for 2 or 3 more correct faces in correct position
3(a)(i)	97	**1**	
3(a)(ii)	Obtuse	**1**	
3(b)	39	**1**	
3(c)	99	**2**	**M1** for (180 – 18) ÷ 2 soi by 81

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Question	Answer	Marks	Partial Marks
3(d)	135	**3**	**M2** for $180 - (360 \div 8)$ oe or $\frac{180\times(8-2)}{8}$ oe **M1** for $360 \div 8$ soi by 45 or $180 \times (8 - 2)$ oe soi by 1080
4(a)	418072	**1**	
4(b)	1 2 4 8 16	**2**	**B1** for 3 or 4 correct and no extra or all correct and one extra
4(c)	31 or 37	**1**	
4(d)(i)	27	**1**	
4(d)(ii)	5832	**1**	
4(d)(iii)	1	**1**	
4(e)	$\frac{7}{15}$ cao	**3**	**M2** for $\frac{5}{15}+\frac{3}{15}$ or $\frac{8k}{15k}$ or $\frac{320}{600}$ or $\frac{280}{600}$ or $\frac{7k}{15k}$, k must be an integer or **M1** for $\frac{1}{5}+\frac{1}{3}$ or 120 + 200 or 320 or 280 or 600 – 120 − 200 oe If **M0** scored, **SC1** for answer of $\frac{47}{100}$ $\frac{467}{1000}$ $\frac{4667}{10000}$
4(f)	135	**2**	**M1** for listing at least 3 multiples of 15 and 27 or [15=]3 × 5 and [27=]3 × 3 × 3 or 3^3 or **B1** for $135k$ as final answer or **B1** for $3 \times 3 \times 3 \times 5$ or $3^3 \times 5$
4(g)	$2^4 \times 3^3$ or $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$	**2**	**M1** for a complete correct factor tree or 2,2,2,2,3,3,3 clearly identified as factors or **B1** for a correct product that equals 432
4(h)	4145.7[3] or 4145.70 or 4150 or 4146	**3**	**M2** for $4000 \times \left(1+\frac{1.2}{100}\right)^3$ oe or **M1** for $4000 \times \left(1+\frac{1.2}{100}\right)^2$ oe

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Question	Answer	Marks	Partial Marks
5(a)(i)	Rotation 90° clockwise oe [centre] (0, 0) oe	**3**	**B1** for each
5(a)(ii)	Enlargement [sf] 0.5 oe [centre] (1, 2)	**3**	**B1** for each
5(b)(i)	Triangle at (3, 2) (1, 5) (1, 2)	**2**	**B1** for translation of $\begin{pmatrix}6\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$
5(b)(ii)	Triangle at (–3, –2) (–5, –2) (–5, –5)	**2**	**B1** for reflection in $y = k$ or $x = 1$
6(a)	$4x + 2$	**3**	**B2** for $4x + c$ or **B1** for $mx + 2$, $m \neq 0$ and **M1** for rise/run of $\frac{4k}{k}$
6(b)(i)	3	**1**	
6(b)(ii)	(0, –4)	**1**	
6(c)	Correct ruled line from $x = -4$ to $x = 5$	**3**	**B2** for 2 correct points plotted or **B1** for one correct point plotted soi or **M1** for line with gradient –2 If **B0** or **M0** scored, **SC1** for a correct table with a minimum of 3 correct coordinates
7(a)(i)	Two correct lines drawn	**2**	**B1** for one correct, no extras or two correct and one extra
7(a)(ii)	2.16	**2**	**M1** for 1.2×1.8
7(b)	40	**3**	**M2** for $\frac{21-15}{15}$ [× 100] or $\left(\frac{21}{15}-1\right)$ [×100] or $\frac{21}{15} \times 100$ [−100] oe or **M1** for $\frac{21}{15}$ or 21−15
7(c)(i)	$\frac{11}{30}$ oe	**1**	
7(c)(ii)	$\frac{25}{30}$ oe	**1**	
7(c)(iii)	0	**1**	

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Question	Answer	Marks	Partial Marks
7(d)	1.6	**2**	**M1** for $\frac{2.4}{1.8}$ or $\frac{1.8}{2.4}$ or $\frac{1.8}{1.2}$ or $\frac{1.2}{1.8}$ soi
7(e)	26.2 or 26.24 to 26.25	**2**	**M1** for $25^2 + 8^2$ or better
8(a)(i)	220	**2**	**M1** for 11
8(a)(ii)	[0]80°	**1**	
8(a)(iii)	*C* in correct position	**2**	**B1** for correct distance of 6 cm or bearing of 300° from *B*
8(a)(iv)	Correct line drawn with 2 pairs of correct arcs	**2**	**B1** for correct line with no or incorrect arcs or correct arcs but no line
8(b)	134.5, 135.5	**2**	**B1** for one correct or both correct but reversed
8(c)	0.41	**2**	**M1** for 1 – (0.35 + 0.04 + 0.2)
8(d)	–2	**1**	
8(e)	15.68 cao	**2**	**M1** for $(1+\frac{12}{100}) \times 14$ oe
8(f)	72	**2**	**M1** for $\frac{9}{25} \times 200$ oe
9(a)(i)	41	**1**	
9(a)(ii)	Add 3 oe	**1**	
9(b)(i)	6, 9, 14	**2**	**B1** for one correct term in correct position If 0 scored, **SC1** for 5, 6, 9
9(b)(ii)	$n^2 + 5 = 261$ or $261 - 5 = 256$ or $256 + 5 = 261$ or $\sqrt{261-5}$	**M1**	
	$(n =)\sqrt{256} = 16$ or 256 is a square number	**A1**	
9(c)	$6n + 21$ oe final answer	**2**	**M1** for $6n + j$ or $kn + 21$ $k \neq 0$

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