Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2018**

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)	7, 3, 6, 8	**2**	**B1** for 3 correct in frequency column or for 2 correct if they all sum to 24 or for all correct tallies if frequency column blank or for 7, 3, 6, 8 seen in tally column with frequency column blank or incorrect.
1(a)(ii)	Correct bar chart with scaled frequency axis	**3**	**B1** for correctly scaled frequency axis **B1FT** all heights correct **B1** equal width bars and gaps
1(b)(i)	64	**2**	**B1** for two from 8.5, 10.5 and 9 soi
1(b)(ii)	37.5	**2**	**M1** for $\frac{their(\mathbf{b})(\mathbf{i})-40}{their(\mathbf{b})(\mathbf{i})}$ oe If 0 scored, **SC1** for answer 62.5
1(c)	[0].85	**2**	**M1** for $6.95 - 3 \times 1.75$ oe
1(d)	1.69	**2**	**M1** for $2.6\times\left(1-\frac{35}{100}\right)$ oe
2(a)	1, 2, 3, 6, 9, 18	**2**	**B1** for four or more correct and no extras or six correct and one extra
2(b)	41 or 43 or 47	**1**	
2(c)	5.4	**2**	**B1** for 5.35[6…] or 5.36
2(d)(i)	1.7	**1**	
2(d)(ii)	2744	**1**	
2(d)(iii)	0.0625 or $\frac{1}{16}$	**1**	
2(e)(i)	7	**1**	

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Question	Answer	Marks	Partial Marks
2(e)(ii)	$2 \times 3^2 \times 5$ or $2 \times 3 \times 3 \times 5$	**2**	**M1** for a complete factor tree or 2, 3, 3, 5 clearly identified as factors or **B1** for a correct product that equals 90
2(e)(iii)	630	**2**	**B1** for $630k$, where $k \geqslant 2$ or for list of multiples of 90 and 126 to at least 630
3(a)(i)	**96** 144 240 129 **131** 260 225 275 500	**1**	both correct
3(a)(ii)	50	**1**	
3(a)(iii)	$\frac{9}{20}$	**2**	**B1** for $\frac{225}{500}$ or $\frac{45}{100}$ or 0.45
3(a)(iv)	12 : 13	**2**	**B1** for 240 : 260 oe If 0 scored, **SC1** for answer 13 : 12
3(a)(v)	$\frac{144}{500}$ oe	**1**	
3(b)(i)	1	**1**	
3(b)(ii)	2.4	**3**	**M1** for $44 \times 1 + 43 \times 2 + 30 \times 3 + 25 \times 4 + 5 \times 8$ **M1dep** for *their* $360 \div 150$
3(c)	540	**2**	**M1** for $\frac{18}{50}[\times 1500]$ or $\frac{1500}{50}[\times 18]$
4(a)(i)	6, 0, 6	**2**	**B1** for two correct
4(a)(ii)	Correct curve	**4**	**B3FT** for 7 or 8 correctly plotted points or **B2FT** for 5 or 6 correctly plotted points or **B1FT** for 3 or 4 correctly plotted points
4(a)(iii)	(2.5, –6.4 to –6.1)	**1**	
4(a)(iv)	–0.7 to –0.4, 5.4 to 5.7	**2**	**FT** their curve **B1** for each
4(b)(i)	$y = -\frac{1}{2}x + 2$ oe	**3**	**M2** for gradient = $-\frac{1}{2}$ oe soi or **M1** for rise / run or gradient = $\frac{1}{2}$ and **B1** for $y = mx + 2$, $m \neq 0$

Question	Answer	Marks	Partial Marks
4(b)(ii)	Correct ruled line for $-5 \leqslant x \leqslant 5$	**2**	**B1** for line through (0, –1) or line parallel to line L or correct short line at least from (–4, 1) to (4, –3)
5(a)(i)	37	**2**	**B1** for 7.4
5(a)(ii)	133	**1**	
5(a)(iii)	T plotted correctly	**2**	**B1** for T 4.4 cm from L **B1** for bearing 210°
5(b)(i)	Correct perpendicular bisector of PQ	**2**	**B1** for correct bisector with wrong/no arcs or for no line and two pairs of correct arcs or for short bisector with correct/incorrect/no arcs
5(b)(ii)	Arc centre Q, radius 7 cm	**2**	**B1** for short arc centre Q , radius 7 cm
	Correct region shaded	**1**	
6(a)(i)	(–2, 5)	**1**	
6(a)(ii)	$\begin{pmatrix} 4 \\ -3 \end{pmatrix}$	**1**	
6(a)(iii)	(5, 4) plotted	**1**	
6(a)(iv)	Parallelogram $PQRS$ correctly drawn	**B1**	**FT** *their R*
	(1, 7)	**B1**	**FT** *their S* dep on first **B1**
6(b)(i)	Translation $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$	**2**	**B1** for each
6(b)(ii)	Correct reflection vertices (3, –3), (1, –3), (3, –4)	**2**	**B1** for reflection in line $x = -1$ or $y = k$
6(b)(iii)	Correct rotation vertices (–3, –1), (–1, –1), (–3, –2)	**2**	**B1** for correct orientation but wrong position
7(a)	75	**2**	**M1** for $\left(1-\frac{7}{10}\right)\times 250$ oe or **B1** for answer 175
7(b)(i)	9080 or 9079 to 9081	**3**	**M2** for $\pi\times 8^2\times 10+\pi\times 15^2\times 10$ soi or **M1** for $\pi\times 8^2\left[\times 10 \text{ or } \times 20\right]$ soi or $\pi\times 15^2\left[\times 10 \text{ or } \times 20\right]$ soi

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Question	Answer	Marks	Partial Marks
7(b)(ii)	98.2 or 98.3 or 98.24 to 98.26	**3**	**M1** for $2\times\pi\times15$ soi **M1** for *their* circumference + 4
7(c)	1245, 1255	**2**	**B1** for one correct or both values correct but reversed
8(a)	$3c + 8d$	**2**	**B1** for $3c$ or $8d$
8(b)	32	**2**	**M1** for $5 \times 4 - 2 \times -6$ or better
8(c)	11	**2**	**M1** for $x - 3 = 8$ or $7x - 21 = 56$ or better
8(d)	$\frac{r-7}{6}$ oe	**2**	**M1** for $6t = r - 7$ or $\frac{r}{6} = t + \frac{7}{6}$
8(e)	$3x + x + x + 15 = 180$ or better leading to $[x =]$ 33	**4**	**M1** for $3x + x + x + 15$ or better **M1** for *their* expression = 180 **M1** for rearranging *their* equation to $ax = b$ If 0 scored, **SC2** for 33 nfww
9(a)	12 150	**2**	**M1** for $\frac{1}{2}\times(120+150)\times90$ oe
9(b)(i)	$[AD =]\sqrt{90^2+(150-120)^2}$	**M2**	or **M1** for $90^2+(150-120)^2$
	= 94.9 or 94.8[…]	**A1**	
9(b)(ii)	4368	**3**	**M2** for $\frac{95+120+150+90}{5}\times48$ oe or **M1** for 95 + 120 + 150 + 90 soi or 455 or $\frac{95}{5}$ and $\frac{120}{5}$ and $\frac{150}{5}$ and $\frac{90}{5}$

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