Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 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.

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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)	Tally for 3, 4, 5 increased by two. Tally for 7 increased by one. Frequencies 3, 5, 14, 10, 11, 3, 3, 0, 1	**2**	**M1** for all four tallies correct or **B1** for correct frequency column If 0 scored **SC1** for correct frequency for *their* tallies
1(a)(ii)	8	**1**	
1(a)(iii)	4	**1**	
1(b)(i)	4	**1**	
1(b)(ii)	2 and 3.5 boxes drawn 16, 3 and 9 frequencies	**2**	**B1** **B1**
1(b)(iii)	Comedy	**1**	
1(b)(iv)	5	**1**	**FT** 14 − *their* music frequency
1(b)(v)	$\frac{52}{60}$ or equivalent fraction	**2**	**B1** for $\frac{8}{60}$ oe or 52 or 0.866 to 0.867
2(a)(i)	27360045	**1**	
2(a)(ii)	1, 2, 4, 5, 10, 20	**2**	**B1** for 4 or 5 correct factors
2(a)(iii)	$\frac{7k}{9k}$ where $k \neq 1$	**1**	
2(a)(iv)	31 or 37	**1**	
2(b)(i)	$17 - 3 \times (5 - 3) = 11$	**1**	
2(b)(ii)	$(3 + 2)^2 - 4 = 21$	**1**	
2(c)	17	**1**	

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Question	Answer	Marks	Partial Marks
3(a)(i)	48	**3**	**B1** for 240 **M1** for $\frac{[their 240]}{10+2+3}[\times 3]$ soi by 16
3(a)(ii)	128	**2**	**M1** for $\frac{k}{15} \times their\ 240$ oe where $k = 2$, 10 or 8 or for *their* **(a)(i)** $\div 3 \times k$ oe where $k = 2$, 10 or 8
3(b)	84.7[0] or 84.69 to 84.7	**3**	**M2** for $600 \times \left(1+\frac{4.5}{100}\right)^3$ oe or **M1** for $600 \times \left(1+\frac{4.5}{100}\right)^2$ oe
3(c)	223.84	**3**	**M2** for $\frac{600 \times 0.864 - 325}{0.864}$ oe or better or **M1** for 600×0.864 or $\frac{325}{0.864}$
4(a)	Rhombus	**1**	
4(b)(i)	(0, –2)	**1**	
4(b)(ii)	136	**1**	
4(c)(i)	5.4	**1**	
4(c)(ii)	21.5 or 21.6	**1**	**FT** *their* **(c)(i)** × 4
4(d)(i)	Reflection *y*-axis oe	**2**	**B1** for each
4(d)(ii)	Rotation 180 oe (0, 0) oe	**3**	**B1** for each
4(e)	Triangle (1, –2) (1, –4) (6, –2)	**2**	**B1** for $\begin{pmatrix}1\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$
5(a)	4 points correctly plotted	**2**	**B1** for 2 or 3 points correctly plotted
5(b)	(40, 18) indicated	**1**	
5(c)	Positive	**1**	
5(d)	Correct ruled line	**1**	
5(e)	76 to 80	**1**	**FT** their ruled line of best fit

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Question	Answer	Marks	Partial Marks
6(a)	9	**2**	**M1** for $\left(1-\frac{1}{3}\right)\times 13.5$ oe or for $13.5-\left(\frac{1}{3}\times 13.5\right)$ oe or **B1** for 4.5[0]
6(b)(i)	1 45 pm	**1**	
6(b)(ii)	2 [h] 54 [min]	**1**	
6(b)(iii)	13	**2**	**M1** for 16 39 + 46 – 17 12 oe or **B1** for 17 25 or 33 seen
6(c)	Complete correct method	**M2**	**M2** for 0.62... and 0.58… or 0.59 and 0.57 [c/ml] oe or 1.60…or 1.61 and 1.70… and 1.75… [ml/c] oe or **M1** for one correct calculation or correct value
	Extra large	**A1**	
6(d)	19 47	**3**	**M1** for $\frac{76}{48}$ soi or for 18 12 + *their* time **A1** for 1 [h] 35 [min] or 95 [min] seen
7(a)	3300	**2**	**B1** for 11 cm seen
7(b)	117	**1**	
7(c)(i)	Correct ruled perpendicular bisector with 2 pairs of arcs	**2**	**B1** for correct bisector drawn without arcs or for two pairs of correct arcs
7(c)(ii)	*C* marked correctly	**2**	**M1** for clear attempt at a line south from *A*
7(d)	*D* marked correctly twice with correct arc(s) and line seen	**4**	**B1** for line indicating correct bearing of 320 measured **B2** for an arc radius 5.5, centre *A*, [meeting their bearing line at least once], or **B1** for an arc any radius, centre *A*, with *D* marked on it [meeting their bearing line at least once], or **B1** for a complete circle centre *A* of any radius, or **M1** for 1650 ÷ 300 If 0 scored **SC2** for *D* marked correctly within tolerance at least once with incorrect/no arc(s) and incorrect/no line seen

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Question	Answer	Marks	Partial Marks
8(a)	Caroline cycles past Rob oe	**1**	
8(b)	9.6	**2**	**M1** for $\frac{8}{50}[\times 60]$
8(c)	Ruled line from (07 25, 0) to (08 45, 8)	**1**	
8(d)	08 00	**1**	
8(e)	Caroline William Rob	**1**	**FT** from William's straight line, provided it reaches at 8 km
9(a)(i)	Diameter	**1**	
9(a)(ii)	Chord	**1**	
9(b)	Angle [in] semi-circle [is 90]	**1**	
9(c)(i)	67.4 or 67.38…..	**2**	**M1** for $\cos[A=]\frac{20}{52}$ or better
9(c)(ii)	$\left[(BC)^2\right]=\sqrt{52^2-20^2}$	**M2**	**M1** for $20^2+(BC)^2=52^2$
9(c)(iii)	480	**2**	**M1** for $0.5\times 20\times 48$ or better
9(c)(iv)	582 or 581.8 to 582.0	**3**	**M1** for $\left[\frac{1}{2}\times\right]\pi\times\left(\frac{52}{2}\right)^2$ or better **M1** for *their* 338π – *their* **(c)(iii)**
10(a)(i)	– 4	**1**	
10(a)(ii)	$2x+k \quad k\neq 3$	**1**	
10(a)(iii)	(0, –5)	**1**	
10(a)(iv)	2.5	**2**	**M1** for $7=4k-3$ or better
10(b)(i)	1, –5, –3, 1, 7	**3**	**B2** for 4 correct **B1** for 3 correct
10(b)(ii)	Correct smooth curve	**4**	**B3FT** for 8 or 7 correct plots or **B2FT** for 5 or 6 correct plots or **B1FT** for 3 or 4 correct plots
10(b)(iii)	$(0.5, h)$ where $-5.5 \leqslant h < -5$	**1**	
10(b)(iv)(a)	Correct line of symmetry drawn	**1**	
10(b)(iv)(b)	$x=0.5$ oe	**1**	

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