Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/32**

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)	4050	**3**	**M1** for $\frac{\text{figs } 89}{\text{figs } 22}$ **A1** for $4045[.\ldots]$ or $4045\frac{5}{11}$ **B1** for *their* answer seen (but not a multiple of 10) correctly rounded to the nearest ten, provided does not round to zero
1(a)(ii)	132	**2**	**M1** for $4650 \div 35$
1(b)	676[.00]	**1**	
1(c)	227.5[0] 97.5[0] 65[.00]	**3**	**M2** for $390 \div (7 + 3 + 2) \times k$ or better where k is 7, 3 or 2 or **M1** for $390 \div (7 + 3 + 2)$ or better, implied by 32.5[0]
1(d)	12	**3**	**M2** for $\frac{3500-3080}{3500}$ [× 100] or $(1 - \frac{3080}{3500})$ [× 100] or $[100 -] \frac{3080}{3500} \times 100$ or **M1** for $\frac{3080}{3500}$ or $3500 - 3080$
1(e)	Fully correct net	**2**	**B1** for at least two correct faces drawn in the correct place
2(a)(i)	Two correct bars	**1**	
2(a)(ii)	3	**1**	
2(b)	68 [h] 15 [min]	**3**	**B1** for 9 [h] 45 [m] or $9\frac{3}{4}$ or 9.75 or 585 seen **M1** for *their* (9 [h] 45 [m], $9\frac{3}{4}$, 9.75 or 585) × 7 soi

Question	Answer	Marks	Partial Marks
2(c)	424	**3**	**M2** for $24 \times 10.5 + 16 \times 6.25 + 8 \times 9$ soi or **M1** for two of 24×10.5, 16×6.25, 8×9
2(d)	30	**1**	
2(e)(i)	21 05 or 9.05 pm	**1**	
2(e)(ii)	20 20 or 8.20 pm	**2**	**M1** for 23 15 [− (10 min)] − (2 h 45 m) soi by 20 30
2(f)	1.45	**2**	**M1** for [5 −] (1.85 + 1.70) or 3.55
2(g)(i)	21	**1**	
2(g)(ii)	–14	**1**	
3(a)(i)	$12c - d$ final answer	**2**	**B1** for $12c$ or $-d$
3(a)(ii)	$8x^{10}$ final answer	**2**	**B1** for $8x^n$ or kx^{10} (n and $k \neq 0$)
3(b)	-1.5 or $-1\frac{1}{2}$ oe nfww	**2**	**M1** for $-2 - 1 = 5x - 3x$ or better or $3x - 5x = 1 + 2$ or better
3(c)	$xy(3x - 5)$ final answer	**2**	**B1** for $y(3x^2 - 5x)$ or $x(3xy - 5y)$ or correct answer spoilt
3(d)	$[r =] \frac{T}{3} - 5$ oe nfww final answer	**2**	**M1** for first correct step e.g. $T = 3r + 15$ or $\frac{T}{3} = r + 5$
4(a)	Enlargement [centre] (6, –5) [sf] 2	**3**	**B1** for each
4(b)	Rotation [centre] (0, 0) oe 180°	**3**	**B1** for each
4(c)	Correct translation to (3, 3), (3, 0), (5, 0)	**2**	**B1** for a translation by $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 5 \end{pmatrix}$
4(d)	Correct reflection to (3, –5), (5, –2),(5, –5)	**2**	**B1** for correct reflection in $x = k$
5(a)	Two correct lines	**2**	**B1** for 1 correct line and no diagonals or 2 correct lines and one diagonal
5(b)	120	**3**	**M2** for $180 - (360 \div 6)$ oe or $(6 - 2) \times 180 \div 6$ oe or **M1** for $360 \div 6$ oe or $(6 - 2) \times 180$ oe

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Question	Answer	Marks	Partial Marks
5(c)	736	**3**	**M2** for $40 \times 24 - (24 - 10) \times (40 - 2 \times 12)$ oe or **M1** for one of these two areas or **B1** for one of 14 or 16 seen OR **M2** for $2 \times (24 \times 12) + 10 \times (40 - 2 \times 12)$ or **M1** for one of these three areas or **B1** for one of 14 or 16 seen OR **M2** for $40 \times 10 + 2 \times (24 - 10) \times 12$ or **M1** for one of these three areas or **B1** for one of 14 or 16 seen
5(d)	84	**2**	**M1** for $180 - 2 \times (180 - 132)$ or better or **B1** for 48 seen
5(e)(i)	63.6 or 63.61 to 63.63	**3**	**M2** for $7.5^2 \times \pi - 6^2 \times \pi$ or better or **M1** for $7.5^2 \times \pi$ or $6^2 \times \pi$ or better
5(e)(ii)	1140 or 1150 or 1144 to 1146	**1**	**FT** *their* **(e)(i)** × 18 evaluated
5(e)(iii)	848 or 848.2 to 848.4	**3**	**M2** for $2 \times \pi \times 7.5 \times 18$ or better or **M1** for $2 \times \pi \times 7.5$ or better If 0 scored **SC1** for 679 or 678.5 to 678.7
6(a)(i)	1	**1**	
6(a)(ii)	2.86 or 2.857 … or $2\frac{6}{7}$	**3**	**M1** for $1 \times 19 + 2 \times 17 + 3 \times 8 + 4 \times 12 + 5 \times 9 + 6 \times 5$ or 200 **M1dep** for *their* 200 ÷ 70
6(a)(iii)	Any correct reason	**1**	e.g. 44 are below and 26 are above or it is 2 or the median is 2 or the 35th and 36th values shown or $\frac{2+2}{2} = 2$ or the 35.5th (value) is 2 or the 35.5th (value) is not 3.5
6(b)(i)	Negative	**1**	
6(b)(ii)	$\frac{10}{17}$ oe	**1**	
6(b)(iii)	Correct ruled line of best fit	**1**	
6(b)(iv)	5 or 6	**1**	must be an integer

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Question	Answer	Marks	Partial Marks
7(a)	8 023 000	**1**	
7(b)	$\frac{7}{17}$ 42% $\frac{3}{7}$ 0.45	**2**	**B1** for converting to decimals or percentages e.g. [0].428 … or [0].429, [0].42, (.45), [0].41..
7(c)(i)	47	**1**	
7(c)(ii)	39	**1**	
7(c)(iii)	$\sqrt{97}$	**1**	
7(d)	5250 5350	**2**	**B1** for each If 0 scored **SC1** for both correct but reversed
7(e)	$\frac{7}{4}$ or $\frac{9}{7}$	**B1**	either fraction seen
	$\frac{7}{4}\times\frac{9}{7}=\frac{9}{4}$ or $\frac{63}{28}$	**M1**	or equivalent improper fractions $\frac{7k}{4k}\times\frac{9m}{7m}=\frac{9n}{4n}$
	$2\frac{1}{4}$ cao	**A1**	
8(a)	7 16 7 0	**3**	**B2** for 2 or 3 correct **B1** for 1 correct
8(b)	Correct curve	**4**	**B3FT** for 8 or 9 points plotted correctly or **B2FT** for 6 or 7 points plotted correctly or **B1FT** for 4 or 5 points plotted correctly
8(c)	$x = 4$	**1**	
8(d)	1.45 to 1.65 and 6.35 to 6.55	**2**	**B1** for each or both correct as co-ordinates
9(a)	53	**1**	
9(b)(i)	30.6	**2**	**M1** for $9 \times 6.8 \div 2$
	cm^2	**1**	
9(b)(ii)	27.1 or 27.08 …	**3**	**M2** for $\sqrt{6.8^2 + 9^2}$ or **M1** for $6.8^2 + 9^2$ or 127.24 or **B1** for $6.8 + 9 + k$, where $9 < k < 15.8$

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