Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2018**

MARK SCHEME

Maximum Mark: 130

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 2018 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:

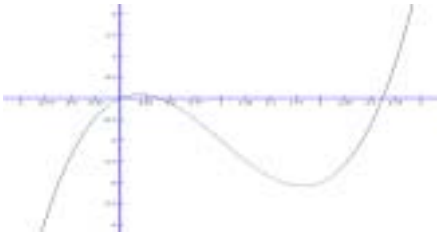
Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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Abbreviations

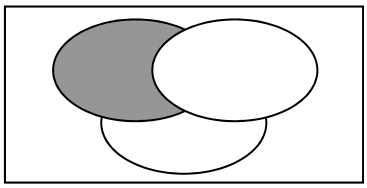
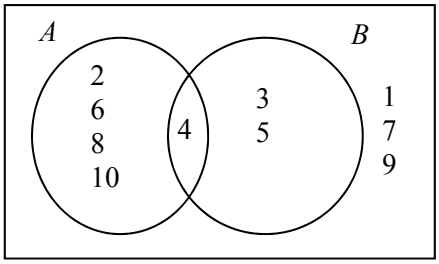
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	2.25 final answer	**2**	**M1** for $\frac{3}{5+3}$ or $\frac{6}{5+3}$ oe
1(a)(ii)	37.5	**1**	**FT** *their* $\frac{\textbf{(a)(i)}}{6}\times 100$
1(a)(iii)	5.5[0] or 5.499 to 5.500	**2**	**M1** for $6 \div 1.091$
1(b)	21	**3**	**M2** for $15\times\sqrt{\frac{352.8}{15\times 12}}$ oe or **SC2** for answer 16.8 or **M1** for $\sqrt{\frac{352.8}{15\times 12}}$ or $\sqrt{\frac{15\times 12}{352.8}}$ seen or **M1** for a correct implicit statement for the length
1(c)	525	**3**	**M2** for $\frac{483}{100-8}[\times 100]$ oe or **M1** for 483 associated with 92 [%]
2(a)(i)	Translation $\begin{pmatrix}5\\8\end{pmatrix}$	**2**	**B1** for each Accept 5 right and 8 up
2(a)(ii)	Enlargement [sf] 0.5 oe [centre] (0, −7)	**3**	**B1** for each
2(a)(iii)	Rotation 90 [anticlockwise] oe Origin oe	**3**	**B1** for each
2(b)	Image at (−8, 1) (−8, 5) (−8, 7) (−4, 1)	**2**	**B1** for reflection of flag *A* in the line $x = -1$ or $y = k$ or for vertices of triangle in correct place but not joined

Question	Answer	Marks	Partial Marks
3(a)	0 –2 0.9	**3**	**B1** for each
3(b)	Correct curve 	**4**	**B3 FT** for 9 or 10 points or **B2 FT** for 7 or 8 points or **B1 FT** for 5 or 6 points
3(c)	−0.45 to –0.35 1 2.35 to 2.45	**3**	**FT** *their* graph **B1** for each in the correct position If zero scored, **SC1FT** for 3 correct values
3(d)(i)	$y = 1 - x$ oe	**2**	**B1** for $y = 1 - kx$ oe, $k \neq 0$ or $y = k - x$ oe or $1 - x$
3(d)(ii)	Correct ruled line and 2.25 to 2.4	**3**	**B2FTdep** for correct ruled line or **B1 dep** for line through (0, 1) when extended but not $y = 1$ or with gradient –1.1 to –0.9 or correct line but freehand or **SC2** for $y = x - 1$ ruled after answer $[y =] x - 1$ in **(d)(i)** **and** **B1** for 2.25 to 2.4
3(e)	Correct tangent and 1.7 to 3.7	**3**	No daylight between tangent and curve at $x = –0.25$. Point of contact is the midpoint between two vertices of daylight and this point of contact must be between –0.35 and –0.15 **B2** for close attempt at tangent at $x = –0.25$ and answer in range OR **B1** for ruled tangent at $x = –0.25$, no daylight Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = –0.35$ and –0.15 and **M1** dep on **B1** or close attempt at tangent at $x = –0.25$ for $\frac{rise}{run}$
4(a)	100.2 nfww	**4**	**M1** for midpoints soi 65, 80, 95, 105, 112.5, 120 **M1** for use of $\sum fx$ with x in correct interval including both boundaries **M1**dep for $\sum fx \div 180$ dep on previous **M1**
4(b)	0.8 2.8 0.65	**3**	**B1** for each If zero scored, **SC1** for 1.6, 5.6 and 1.3 seen

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Question	Answer	Marks	Partial Marks
4(c)	8 34 69 136 164	**2**	**B1** for one error **FT** other values or for 3 or 4 correct
4(d)	Correct diagram	**3**	**B1FT** for correct vertical placement for 6 plots **B1** for correct horizontal placement for 6 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If zero scored, **SC1FT** for 5 out of 6 correct plots
4(e)(i)	15 to 17	**2**	**B1** for [LQ =] 93 to 94 or [UQ =] 109 to 110
4(e)(ii)	107 to 109	**2**	**B1** for 126 seen
4(e)(iii)	66 to 72	**2**	**FT** their graph for 2 marks **B1** for answer 106 to 114 or **B1FT** *their* graph reading at 106 cm seen
5(a)(i)	[h =] $253.8 \div 18 \div \left(\frac{6}{2}\right)$ or [h =] $\frac{253.8 \times 2}{6 \times 18}$ or [h =] $\frac{253.8}{18 \times \frac{6}{2}}$	**3**	For **M3** no errors at any stage **M2** for $253.8 = \frac{1}{2} \times 6 \times h \times 18$ oe (no previous errors) or **M1** for triangle area = $\frac{1}{2} \times 6 \times h$ soi
5(a)(ii)	38.1 or 38.06 to 38.08	**2**	**M1** for $\tan = \frac{4.7}{6}$ oe
5(b)	358 or 357.9 to 358	**6**	**M1** for $6^2 + 4.7^2$ **M1** for $\sqrt{6^2 + 4.7^2} \times 18$ [× 2] **M1** for 6 × 18 [× 2] **M1** for 4.7 × 18 **M1** for $2 \times \frac{1}{2} \times 6 \times 4.7$ oe
6(a)(i)	14	**1**	
6(a)(ii)	16	**1**	
6(a)(iii)	$\frac{20}{462}$ oe	**3**	**M2** for $\frac{5}{22} \times \frac{4}{21}$ or **M1** for $\frac{5}{22}$ seen

Question	Answer	Marks	Partial Marks
6(a)(iv)	Correct shading 	**1**	
6(b)(i)	Fully correct Venn diagram 	**4**	**B1** for each correct region
6(b)(ii)	3 4 5	**1**	**FT** *their* **(b)(i)**
7(a)	42.2 or 42.23....	**2**	**M1** for $\frac{1}{2}\times 8.9\times 12.5\times \sin 130.6$ oe
7(b)(i)	27[.0] or 27.00 to 27.01	**3**	**M2** for $\frac{11.6\times \sin 123.5}{21.3}$ or **M1** for $\frac{11.6}{\sin BCD}=\frac{21.3}{\sin 123.5}$ oe
7(b)(ii)	15.9 or 15.90 to 15.91	**5**	**M1** for angle ABD = *their* angle BCD + 33.5 **and** **M2** for $11.6^2+18^2-2\times 11.6\times 18\times\cos(their ABD)$ or **M1** for implicit version **A1** for 252.9 to 253
8(a)	(5, 6)	**1**	
8(b)	$[y=]-\frac{4}{5}x+3$ nfww	**3**	**B2** for $[y=]-\frac{4}{5}x+c$ nfww or **M1** for $\frac{rise}{run}$ using any two of (–5, 7) (0, 3) and (5, –1) **and B1** for $[y=]mx+3$ $(m\neq 0)$

Question	Answer	Marks	Partial Marks
8(c)	$y = -\frac{4}{5}x - 2$ oe	**2**	**FT** *their* gradient from **8(b)** **B1** for y = (*their* gradient)$x + c$ (c not 0) or for $y = mx - 2$ $(m \neq 0)$ or for $-\frac{4}{5}x - 2$ alone
8(d)(i)	$y = \frac{5}{4}x + 4$ oe	**3**	**M1** for $-\frac{1}{\textit{their}\ \text{gradient}}$ from **8(b)** **M1** for (8, 14) substituted into *their* $y = mx + c$ or $\frac{y-14}{x-8} = m$ or better
8(d)(ii)	8.54 or 8.544...	**3**	**M2** for $(14 - \textit{their}\,6)^2 + (8 - \textit{their}\,5)^2$ or better or **M1** for $14 - \textit{their}\,6$ and $8 - \textit{their}\,5$ seen
8(d)(iii)	(4, 6)	**2**	**B1** for each
9(a)(i)	$\frac{72}{m}$	**1**	
9(a)(ii)	$\frac{72}{m+0.9}$	**1**	
9 (b)	$\frac{72}{m} - \frac{72}{m+0.9} = 4$ oe	**M1**	**FT** *their* **(a)(i)** and **(a)(ii)** if expressions in m
	$72(m+0.9) - 72m = 4m(m+0.9)$ oe	**M1**	**Dependent** on **M1** and **correct** fractions
	$[72m - 72m] + 64.8 = 4m^2 + 3.6m$ oe nfww	**A1**	
	Correct completion to $10m^2 + 9m - 162 = 0$	**A1**	
9(c)(i)	3.6 and –4.5 final answer	**3**	**B2** for $(2m+9)(5m-18)$ or $\frac{-9 \pm \sqrt{(9)^2 - 4(10)(-162)}}{2 \times 10}$ or better or **B1** for $(am+b)(cm+d)$ where ac = 10 and either $bd = -162$ or $ad + bc = 9$ or for $\sqrt{(9)^2 - 4(10)(-162)}$ or better or $\frac{-9 \pm \sqrt{q}}{2(10)}$ or better
9(c)(ii)	20	**1**	

Question	Answer	Marks	Partial Marks
10(a)	132.26 to 132.28 or 132.3	**5**	**B1** for angle *ABO* or angle *CBO* = 90 soi **M1** for tan [*XOB*] $= \frac{15}{8}$ oe **M1** for tan [*BOY*] $= \frac{22.4}{8}$ oe **A1** for [*BOY* =]70.3… or [*XOB* =] 61.9….
10(b)	18.4 or 18.5 or 18.43 to 18.48	**2**	**M1** for $\frac{\textit{their}\ \textbf{(a)}}{360} \times 2 \times \pi \times 8$ oe
10(c)	75.7 to 75.9	**4**	**M1** for $\frac{1}{2}(15 + 22.4) \times 8$ oe **M2** for $\frac{\textit{their}\ (\textbf{a})}{360} \times \pi \times 8^2$ oe or **M1** for one sector either $\frac{\textit{inv}\tan\left(\frac{15}{8}\right)}{360} \times \pi \times 8^2$ oe or $\frac{\textit{inv}\tan\left(\frac{22.4}{8}\right)}{360} \times \pi \times 8^2$ oe
11(a)	$5\left(m - 2p^2\right)\left(m + 2p^2\right)$ final answer	**3**	**M2** for $(5m + k)(m + j)$ where $kj = -20p^4$ or $5j + k = 0$ or **M1** for $5\left(m^2 - 4p^4\right)$ seen
11(b)	[*P* =] $\frac{100A}{100 + TR}$ final answer	**3**	**M1** for 100*A* = 100*P* + *PRT* or for *A* = *P*(1+ $\frac{RT}{100}$) **M1** for 100*A* = *P*(100 + *RT*) or for $\frac{A}{1 + \frac{RT}{100}} = P$ or for 100*A* = *P*(1 + *RT*) after 100*A* = *P* + *PRT* as first step

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