Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 4 (Extended) **March 2019**

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 March 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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.

Abbreviations

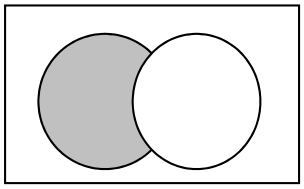
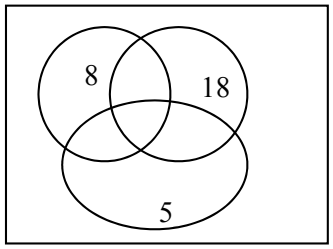
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)	473	**2**	**M1** for 645 ÷ (11 + 4)
1(b)	212.5	**2**	**M1** for 50×4.25
1(c)	31.5 or 31.45 to 31.46	**3**	**M2** for $54 \div 1\frac{43}{60}$ oe or **M1** for time =1h 43min or 103 [mins] or 54 ÷ *their* time
1(d)	875	**1**	
1(e)	10.4 or 10.38 to 10.39	**1**	
1(f)(i)	30 [×] 70 and 2100	**1**	
1(f)(ii)	both numbers rounded up oe	**1**	
2(a)(i)	Reflection $x = 1.5$	**2**	**B1** for each
2(a)(ii)	Rotation (0, –1) 90° [anticlockwise] oe	**3**	**B1** for each
2(b)(i)	Image at (5, –1) (6, –1) (6, –3)	**2**	**B1** for correct size and orientation but wrong position If 0 scored, **SC1** for enlargement SF $\frac{1}{2}$ with centre (3, 0)
2(b)(ii)	Image at (–6, 3) (–4, 3) (–6, 7)	**2**	**B1** for translation $\begin{pmatrix} -3 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 1 \end{pmatrix}$
2(b)(iii)	Image at (2, –1) (2, –3) (6, –3)	**3**	**M2** for 3 correct coordinates soi or **M1** for $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} -1 & -3 & -3 \\ 2 & 2 & 6 \end{pmatrix}$ or **B1** for stating reflection in $y = x$

Question	Answer	Marks	Partial Marks
3(a)	$\frac{5}{9}$ oe	**1**	
3(b)	$\frac{80}{153}$ oe	**3**	**M2** for $2\times\frac{10}{18}\times\frac{8}{17}$ oe or **M1** for $\frac{10}{18}\times\frac{8}{17}$ oe If 0 scored, **SC1** for $\frac{160}{324}$ oe
3(c)	$\frac{11}{51}$ oe	**4**	**M3** for $\frac{10}{18}\times\frac{9}{17}\times\frac{8}{16}+\frac{8}{18}\times\frac{7}{17}\times\frac{6}{16}$ oe or **M2** for $\frac{10}{18}\times\frac{9}{17}\times\frac{8}{16}$ oe or $\frac{8}{18}\times\frac{7}{17}\times\frac{6}{16}$ oe or **M1** for $\frac{10}{18},\frac{9}{17},\frac{8}{16}$ or $\frac{8}{18},\frac{7}{17},\frac{6}{16}$ If 0 scored, **SC1** for $\frac{1512}{5832}$ oe
4(a)	Correct ruled line with *D* marked	**2**	**B1** for correct ruled line or short line
4(b)	47.5	**2**	**B1** for 9.5 or 95 mm seen or for answer figs 465 to figs 485
4(c)	Correct arc radius 7 cm	**2**	**B1** for complete arc other radius, centre *A* or correct but short arc
	Correct ruled perpendicular bisector of *BC* with correct pairs of arcs	**2**	**B1** for correct perpendicular bisector without correct arcs or for correct arcs, no/incorrect line
	Correct ruled bisector of angle *BCD* with correct pairs of arcs	**2**	**B1** for correct angle bisector without correct arcs or for correct arcs, no/incorrect line
	correct region shaded	**1**	Dep on at least **B1B1B1** and five boundaries one of which is an arc
4(d)	[1 :] 500	**1**	

Question	Answer	Marks	Partial Marks
5(a)	–2.1, 1.6, –1.7, 2.1	**3**	**B2** for 3 correct or **B1** for 2 correct
5(b)	Fully correct curve	**4**	**B3FT** for 8 or 9 correct plots or **B2FT** for 6 or 7 correct plots or **B1FT** for 4 or 5 correct plots
5(c)	line $y = \frac{1}{2}(1-x)$ ruled	**M2**	**M1** for line with gradient $-\frac{1}{2}$ **M1** for line through $(0, \frac{1}{2})$ but not $y = \frac{1}{2}$
	–2.15 to –2.01 –0.45 to –0.2 2.25 to 2.45	**B2**	**B1** for two correct
5(d)	number of intersections of *their* curve and the line $y = 1$	**1**	strict **FT** for *their* curve
6(a)	5.83 or 5.832 to 5.833	**5**	**B2** for sector angle = 210 soi or **M1** for $[\cos DOE =] \frac{0.25}{0.5}$ oe **M2** for $\frac{their 210}{360} \times 2 \times \pi \times 0.5 + 2 \times 1.5 + 2 \times 0.5$ oe or **M1** for $\frac{their 210}{360} \times 2 \times \pi \times 0.5$ oe isw
6(b)	1.21 or 1.208…	**3**	**M2** for $\frac{their 210}{360} \times \pi \times 0.5 \times 0.5 + 1.5 \times 0.5$ oe or **M1** for $\frac{their 210}{360} \times \pi \times 0.5 \times 0.5$ oe isw
6(c)(i)	4[.00...]	**3**	**M2** for $0.5 \times \sqrt{\frac{77.44}{their \textbf{(b)}}}$ oe or **M1** for $\sqrt{\frac{77.44}{their \textbf{(b)}}}$ or $\sqrt{\frac{their \textbf{(b)}}{77.44}}$ or for $\frac{their \textbf{(b)}}{77.44} = \frac{0.5^2}{r^2}$ oe
6(c)(ii)	2.20704	**3**	**M2** for 77.44 × 1.5 × 19 ÷ 1000 oe or **M1** for figs 2207[04] or figs 221 seen or [vol =] 77.44 × 1.5

Question	Answer	Marks	Partial Marks
7(a)(i)	111.25	**4**	**M1** for midpoints **soi** (25, 75, 112.5, 137.5, 175) **M1** for $\sum fx$ with x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\sum fx \div 20$
7(a)(ii)	2 7 11 17	**2**	**B1** for three correct
7(a)(iii)	$\frac{3}{20}$ oe	**1**	
7(b)	20 6	**2**	**B1** for one correct value or [SF =] 5 or $\frac{1}{5}$ oe
7(c)(i)	5 nfww	**3**	**M2** for $\sum fx \div \sum f = 4.28$ oe or **M1** for $179 + 7x$ oe or $4.28 \times (45 + x)$ oe seen
7(c)(ii)	3	**1**	
7(c)(iii)	4	**1**	
8(a)	–3	**1**	
8(b)	$\frac{12}{11}$ oe	**2**	**M1** for $\frac{3}{\frac{3}{x+2}+2}$ soi
8(c)	$64x-45$ final answer	**2**	**M1** for $8(8x-5)-5$ isw
8(d)	$\frac{x+5}{8}$ oe final answer	**2**	**M1** for a correct first step $y+5=8x$, $\frac{y}{8}=x-\frac{5}{8}$ or $x=8y-5$
8(e)	$\frac{8x^2+11x-13}{x+2}$ final answer	**3**	**M1** for $(8x-5)(x+2)-3$ oe isw **B1** for common denominator $(x+2)$

Question	Answer	Marks	Partial Marks
8(f)(i)	$(8x-5)^2+6 = 19$	**M1**	
	$64x^2-40x-40x+25$	**B1**	
	$64x^2-40x-40x+25+6=19$ oe leading to $16x^2-20x+3=0$	**A1**	with no errors and must show $(8x-5)^2+6 = 19$ with no omissions after this
8(f)(ii)	$\frac{[--]20\pm\sqrt{([-]20)^2-4(16)(3)}}{2\times16}$ oe	**2**	**B1** for $\sqrt{([-]20)^2-4(16)(3)}$ or better or **B1** for $\frac{[--]20+\sqrt{q}}{2(16)}$ oe or $\frac{[--]20-\sqrt{q}}{2(16)}$
	0.17 and 1.08 final ans	**2**	**B1** for each If 0 scored, **SC1** for answer 0.2 and 1.1 or answer – 0.17 and –1.08 or 0.174... and 1.075 to 1.076 seen or 0.17 and 1.08 seen in working
9(a)(i)(a)	$\in$	**1**	
9(a)(i)(b)	$A \cap B$	**1**	
9(a)(ii)	B or A'	**1**	
9(b)		**1**	
9(c)(i)	$3x+7=19$ oe	**M1**	must see 19 and 7
	$3x=19-7$ or better leading to $x = 4$	**A1**	with no errors seen
9(c)(ii)		**2**	**B1** for 2 correct
9(c)(iii)	$\varnothing$ or { }	**1**	
9(c)(iv)	15	**1**	

Question	Answer	Marks	Partial Marks
10(a)	correctly equating one set of coefficients	**M1**	or making x or y the subject of one equation correctly
	correct method to eliminate one variable	**M1**	or substitution for x or y for *their* rearranged formula
	$x = 7$ $y = -3$	**A2**	**A1** for one correct value If A0 scored, **SC1** for 2 values satisfying one of the original equations or if no working shown, but 2 correct answers given
10(b)	2	**3**	**M1** for $y = \frac{k}{(x+3)^2}$ oe **M1** for $y = \frac{\textit{their } k}{(7+3)^2}$ oe OR **M2** for $8(2+3)^2 = y(7+3)^2$ oe
10(c)	$x > -5$ final answer	**3**	**M1** for $3x - 6 < 7x + 14$ **M1** for $\textit{their}(-6) - \textit{their}14 < 7x - 3x$ oe
11(a)(i)	77 243	**2**	**B1** for each
11(a)(ii)(a)	$2n^2 + 5$ oe	**2**	**M1** for a quadratic expression as the answer or **B1** for common 2nd difference of 4
11(a)(ii)(b)	3^{n-1} oe	**2**	**B1** for 3^k oe where k is a linear function of n
11(b)(i)	21	**1**	
11(b)(ii)	11	**3**	**B2** for $(4n + 45)(n - 11)$ seen or **B1** for $4n^2 + n + 3 = 498$ oe