Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 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 October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

© UCLES 2019

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.

© UCLES 2019

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)	5 : 6	**1**	
1(a)(ii)	2.0736[0] × 10^5 final answer	**3**	**B2** for 207360 oe or **M1** for 16 × 18 × 720
1(b)(i)	26780	**2**	**M1** for 18540 ÷ 9 soi
1(b)(ii)	1.36	**2**	**M1** for 0.85 × 1.6 oe or **B1** for 0.51 or 51
1(c)	66.7 or 66.66 to 66.67	**5**	**M4** for $\frac{(2.3-1.5\times0.92)}{1.5\times0.92}$[×100] oe or $\frac{2.3\times100}{1.5\times0.92}$ oe **OR** **Working in euros** **B2** for [€]1.38 or **M1** for 1.5[0] × 0.92 **M2dep on B2 or M1** for $\frac{2.3-\textit{their}\ 1.38}{\textit{their}\ 1.38}$[×100] oe or $\frac{2.3-\textit{their}\ 1.38}{\textit{their}\ 1.38}\times100$ oe or **M1** for 2.3 – *their* 1.38 or $\frac{2.3}{\textit{their}\ 1.38}$ **OR** **Working in dollars** **B2** for [$]2.50 or **M1** for or 2.3[0] ÷ 0.92 **M2dep on B2 or M1** for $\frac{\textit{their}\ 2.5-1.5}{1.5}$[×100] oe or $\frac{\textit{their}2.5}{1.5}\times100$ or **M1** for *their* 2.5 – 1.5 or $\frac{\textit{their}2.5}{1.5}$

Question	Answer	Marks	Partial Marks
1(d)	219 000 or 218814[.3….] rounded to 4 sf or more	**3**	**B2** for 414000 or 414414[.3….] rounded to 4 sf or more or **M2** for $195600 \times \left(1+\frac{8.7}{100}\right)^{9}$ [– 195600] or **M1** for $195600 \times \left(1+\frac{8.7}{100}\right)^{k}$ or better (k >1 and an integer)
2(a)(i)	54	**1**	
2(a)(ii)	29	**2**	**M1** for [UQ =] 65 or [LQ =] 36
2(a)(iii)	32	**1**	
2(a)(iv)	17, 18 or 19	**2**	**M1** for 61 to 63 written or for decimal answer in range 17 to 19
2(b)(i)	18, 26, 26	**2**	**B1** for 1 or 2 correct
2(b)(ii)	51 nfww	**4**	**M1** for 10 , 30 , 50 , 70 , 90 soi **M1** for Σfx **M1 dep** for *their* $\Sigma fx \div \Sigma f$
2(c)(i)	75	**1**	
2(c)(ii)	IQR is bigger for the girls with [boys =] 20 seen oe	**2**	**FT** *their* IQR from (a)(ii) **M1** for IQR for boys = 20 isw or for girls IQR is bigger than boys IQR oe isw **FT** *their* IQR from (a)(iii)
3(a)(i)	(3, 5.5)	**2**	**B1** for either value correct
3(a)(ii)	$\frac{5}{4}x+\frac{7}{4}$ final answer	**3**	**B2** for answer $\frac{5}{4}x + c$ oe or for correct equation in different form or **M1** for $\frac{8-3}{5-1}$ oe **and M1** for correct substitution shown of (1, 3) or (5, 8) or *their* (a)(i) into $y =$ (*their m*)$x + c$ oe
3(b)(i)	(6, 1) (10, 6)	**2**	**B1** for 2 or 3 values correct
3(b)(ii)	(–3, 1) (–8, 5)	**2**	**B1** for 2 or 3 values correct If 0 scored, **SC1** for (3, –1) and (8, –5)
3(b)(iii)	(3, 3) (–1, 8)	**2**	**B1** for 2 or 3 values correct but not for (1, 3) and (5, 8)

© UCLES 2019

Question	Answer	Marks	Partial Marks
3(b)(iv)	(5, –3) (11, –8)	**2**	**B1** for either or **M1** for $\begin{pmatrix}-1 & 2\\ 0 & -1\end{pmatrix}\begin{pmatrix}1\\3\end{pmatrix}$ or $\begin{pmatrix}-1 & 2\\ 0 & -1\end{pmatrix}\begin{pmatrix}5\\8\end{pmatrix}$
3(c)	Enlargement –2 Origin oe	**3**	**B1** for each
4(a)	452 or 452.2 to 452.4…	**2**	**M1** for $\left[\frac{1}{2}\times\right]\frac{4}{3}\times\pi\times 6^3$
	cm^3	**1**	
4(b)(i)(a)	400 or 399.6 to 399.9	**6**	**B3** for [*CD* =] $\sqrt{72.96}$ or [angle *CBD* =] 58.7 or 58.66 to 58.67 or **M2** for $\sqrt{10^2-5.2^2}$ oe or [*CBD* =] $\cos^{-1}\left(\frac{5.2}{10}\right)$ oe or **M1** for $(CD)^2 + 5.2^2 = 10^2$ oe or $\cos[CBD] = \frac{5.2}{10}$ oe or $\sin[CDB] = \frac{5.2}{10}$ oe **M1dep** for $\frac{5.2\times \textit{their } CD}{2}$ oe or $\frac{1}{2}\times 5.2\times 10\times\sin(\textit{their } CBD)$ oe **M1** for *their* area × 18 oe
4(b)(i)(b)	14.6 or 14.62 to 14.63…	**4**	**M3** for $\sin BEC = \frac{5.2}{\sqrt{10^2+18^2}}$ oe or **M2** for [*BE*=] $\sqrt{10^2+18^2}$ oe seen or [*EC* =] $\sqrt{18^2+10^2-5.2^2}$ oe seen or **M1** for [BE^2 =] $10^2 + 18^2$ oe seen or [EC^2=] $18^2 + 10^2 - 5.2^2$ seen
4(b)(ii)	125 or 124.9 to 125.0…	**3**	**B2** for 55[.0…] seen or **M2** for $180 - \tan^{-1}\left(\frac{10}{7}\right)$ oe or $\cos EGB = \frac{11^2+(10^2+7^2)-(10^2+18)^2}{2\times 11\times\sqrt{10^2+7^2}}$ oe or **M1** for $\tan[\ \ ] = \left(\frac{10}{7}\right)$ oe or for $(10^2 + 18^2) = 11^2 + (10^2 + 7^2) - 2\times 11\times$ $\sqrt{10^2+7^2}\ \cos EGB$ oe

Question	Answer	Marks	Partial Marks
5(a)	3.5, 15, 3.9	**3**	**B1** for each
5(b)	Correct graph	**5**	**B4** for correct curves but branches joined or touching y-axis or **B3FT** 10 or 11 points or **B2FT** for 8 or 9 points or **B1FT** for 6 or 7 points **B1indep** two separate branches not touching or crossing y-axis
5(c)	0.5 to 0.6 and 1.3 to 1.6	**2**	**B1** for each or both correct but in reverse order
5(d)	1	**1**	
5(e)(i)	$y = 3x + 1$ ruled and 0.3 to 0.49	**3**	**B2** for correct ruled line that crosses *their* curve or **B1** for $y = 3x + 1$ soi or freehand line or ruled line with gradient 3 or with y – intercept at 1 (but not $y = 1$)
5(e)(ii)	$[a =] -6$ $[b =] -2$ $[c =] -4$	**3**	**M2** for $x^4 + 2 - 4x = 6x^3 + 2x^2$ or better seen or **B1** for each correct value to a maximum of 2 marks If 0 scored, **SC1** for answer $[a =] 6$, $[b =] 2$ and $[c =] 4$ or for $x^5 + 2x - 4x^2 = 6x^4 + 2x^3$ or better
6(a)(i)	13.9[0…] from cosine rule	**4**	**M2** for $8^2 + 13^2 - 2 \times 8 \times 13\cos 79$ or **M1** for $\cos 79 = \frac{13^2 + 8^2 - BC^2}{2 \times 8 \times 13}$ **A1** for 193 ....
6(a)(ii)	66.6 or 66.60… to 66.65 from sine rule	**3**	**M2** for $[\sin ACB =] \frac{13 \times \sin 79}{their(a)(i)}$ or **M1** for $\frac{\sin ACB}{13} = \frac{\sin 79}{their(a)(i)}$ oe
6(b)(i)	$\frac{1}{2}(x + 4)(4x - 5)\sin 30 = 70$	**M1**	
	$4x^2 + 16x - 5x - 20 = 280$	**M2**	**Dep on M1** **B1** for $4x^2 + 16x - 5x - 20$ or better
	Leading to $4x^2 + 11x - 300 = 0$	**A1**	with no errors or omissions seen

© UCLES 2019

Question	Answer	Marks	Partial Marks
6(b)(ii)	$\frac{-11 \pm \sqrt{11^2 - 4 \times 4 \times -300}}{2 \times 4}$	**B2**	**B1** for $\sqrt{11^2 - 4(4)(-300)}$ or better or for $\frac{-11 + \sqrt{q}}{2 \times 4}$ or $\frac{-11 - \sqrt{q}}{2 \times 4}$
	–10.14 and 7.39	**B2**	**B1** for each or **SC1** for final answers –10.1 or –10.144 to –10.143 **and** 7.4 or 7.393 to 7.394 or –10.14 **and** 7.39 seen in working or for –7.39 **and** 10.14 as final answer
6(b)(iii)	11.4 or 11.39…	**1**	**FT** *their* positive root + 4
7(a)(i)	13	**1**	
7(a)(ii)	3	**2**	**M1** for $\text{h}\left(\frac{10}{30}\right)$ oe soi or $27^{\frac{10}{x}}$
7(a)(iii)	$\frac{7-x}{2}$ oe final answer	**2**	**M1** for $x = 7 - 2y$ or $y - 7 = -2x$ or $7 - y = 2x$ or $-\frac{y}{2} = -\frac{7}{2} + x$ oe
7(b)	0.75 oe final answer	**3**	**M1** for $\frac{10}{2x+1} = 4$ **M1** for $10 = 8x + 4$ or better
7(c)	$\frac{70-19x}{x(7-2x)}$ or $\frac{70-19x}{7x-2x^2}$ final answer	**3**	**M1** for $x + 10(7 - 2x)$ or better isw **B1** for common denominator $x(7 - 2x)$ oe isw
7(d)	3 final answer	**1**	
8(a)(i)	$\frac{m-7}{5}$ oe final answer	**2**	**M1** for $5p = m - 7$ or $p + \frac{7}{5} = \frac{m}{5}$
8(a)(ii)	$[\pm]\sqrt{\frac{y^2-h}{2}}$ or $[\pm]\sqrt{\frac{h-y^2}{-2}}$ oe final answer	**3**	**M1** for first correct step isolate term in p or divide by ±2 **M1** for second correct step FT *their* first step
8(b)(i)	$\begin{pmatrix}0\\5\end{pmatrix}$	**1**	
8(b)(ii)	$\begin{pmatrix}-3\\-1\end{pmatrix}$	**1**	

Question	Answer	Marks	Partial Marks
8(b)(iii)	3.22 or 3.216... to 3.220...	**6**	**B3** for [angle AOB =] 36.8 or 36.9 or 36.84 to 36.87 or **M2** for tan[AOB] = $\frac{3}{4}$ oe or for [AOB =]2 × $\sin^{-1}\left(\frac{\sqrt{(5-4)^2+(0--3)^2}}{10}\right)$ oe or for cos [AOB =] $\frac{5^2+5^2-\left(\sqrt{(5-4)^2+(0--3)^2}\right)^2}{2\times5\times5}$ oe or **M1** for recognition of right-angle with perpendicular from B to OA or x-axis or for [AB^2 =] $(5-4)^2+(0--3)^2$ or better oe or (*their* AB)^2 = $5^2 + 5^2 - 2 \times 5 \times 5 \times \cos OAB$ oe **M2** for $\frac{\textit{their}\ \text{angle}\ AOB}{360}\times2\times\pi\times5$ oe or **M1** for radius = 5 soi
9(a)	171 or 171.0…	**3**	**M2** for $\frac{7.6}{160}\times60\times60$ oe or **M1** for $\frac{7.6}{160}$ or $\frac{7.6}{2\frac{2}{3}}$ or $\frac{7.6}{2\,\text{min}\,40\,\text{sec}}$ If 0 scored, **SC1** for answer 189 or 188.6 to 188.7
9(b)(i)	77 [min] 20 [s]	**4**	**M3** for $\frac{32}{12}\times29$ oe or **B2** for 4640 or 1.29 or 1.288 to 1.289, $\frac{58}{45}$ oe or 32 laps or 29 laps or **M2** for $2^5\times5\times29$ oe or **M1** for 2 m 40 sec ÷ (2 m 40 sec – 2 m 25 sec) soi for 2 m 25 sec ÷ (2 m 40 sec – 2 m 25 sec) soi or for an attempt to find LCM or 23 200 seen or correctly find prime factors of 145 or 160 or for $\frac{7.6}{145}$ or $\frac{7.6}{2\frac{5}{12}}$ or $\frac{7.6}{2\,\text{min}\,25\,\text{sec}}$ oe, provided SC1 not earned in part (a)
9(b)(ii)	220.4	**2**	**M1** for *their* (b)(i) ÷ 2min 40 sec [× 7.6] oe or *their* (a) × *their* (b)(i) ÷ 60 oe

© UCLES 2019