Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

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.

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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)	1200	**2**	**M1** for 1962 ÷ 1.635
1(a)(ii)	1667.7[0] final answer	**2**	**M1** for $1962 \times (1 - \frac{15}{100})$ oe or **B1** for 294.3[0] If 0 scored, **SC1** for answer 1020
1(a)(iii)	275	**2**	**M1** for 220 ÷ *their* (5 – 1) soi
1b(i)	165	**3**	**M2** for $\frac{9752-3680}{3680}[\times 100]$ oe or $\frac{9752}{3680} \times 100$ oe or **M1** for $\frac{9752}{3680}$ or 9752 – 3680
1b(ii)	51 200	**3**	**M2** for $\frac{74240}{100+45}[\times 100]$ oe or **M1** for 74 240 associated with 145[%] oe
2(a)	–1.5	**3**	**M1** for $30 + 2x = 9 - 12x$ or $10 + \frac{2}{3}x = 3 - 4x$ **M1** for collecting *their* terms correctly to reach $ax = b$
2(b)	$6ab^2(2b + 3a^2)$ final answer	**2**	**M1** for any correct partial factorisation seen or for correct answer seen
2(c)(i)	$10a^5c^9$ final answer	**2**	**B1** for final answer with $10a^kc^9$ or $10a^5c^k$ or ka^5c^9
2(c)(ii)	$\frac{8a^6}{c^9}$ or $8a^6c^{-9}$ final answer	**2**	**B1** for final answer with $\frac{8a^6}{c^k}$ or $\frac{8a^k}{c^9}$ or $\frac{ka^6}{c^9}$ $[k \neq 0]$ or for correct answer seen

Question	Answer	Marks	Partial Marks
2(d)	0.5 or $\frac{1}{2}$	**3**	**M1** for $y = \frac{k}{(x+2)^2}$ oe **B1** for $k = 50$ or **M2** for $2(3 + 2)^2 = y(8 + 2)^2$ oe
2(e)	$\frac{7x-x^2}{2(x-2)}$ or $\frac{7x-x^2}{2x-4}$ oe final answer	**3**	**M1** for $5 \times 2 - (x - 5)(x - 2)$ oe seen **M1** for common denominator $2(x - 2)$ oe isw
3(a)	Rotation $90^{[\circ]}$ clockwise oe Origin oe	**3**	**B1** for each
3(b)(i)	Image at (–4, –1) (–4, –4) (–2, –4)	**1**	
3(b)(ii)	Image at (3, –1) (5, –1) (3, –4)	**2**	**B1** for translation by $\begin{pmatrix}7\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-5\end{pmatrix}$ or for 3 correct points not joined
3(b)(iii)	Image at (–2, ½) (–2, 2) (–1, 2)	**3**	**B2** for 3 correct co-ordinates soi in working or correct size and orientation in wrong position or **M1** for $\begin{pmatrix}0.5 & 0\\0 & 0.5\end{pmatrix}\begin{pmatrix}-4 & -4 & -2\\1 & 4 & 4\end{pmatrix}$ shown or for statement: enlargement, sf 0.5, (0, 0)
4(a)	$\frac{1}{2} \times 4(x - 1) \times (2x + 5)[\sin 90] = 30$ oe	**M1**	
	$8x^2 – 8x + 20x – 20$ or better	**B1**	correct expansion of brackets
	Completion to $2x^2 + 3x – 20 = 0$	**A1**	with no errors or omissions seen
4(b)	$(2x – 5)(x + 4)$	**M2**	Allow **M2** for e.g. $2x(x + 4) – 5(x + 4)$ then $2x – 5[= 0]$ and $x + 4[= 0]$ **M1** for $2x(x + 4) – 5(x + 4)$ or $x(2x – 5) + 4(2x – 5)$ or $(2x + a)(x + b)$ [= 0] where $ab = – 20$ or $a + 2b = 3$ [a, b integers]
	2.5 and –4 cao	**B1**	

Question	Answer	Marks	Partial Marks
4(c)	11.7 or 11.66 … or 11.67	**3**	**M2dep** for $(4(their 2.5-1))^2+(2\times their 2.5+5)^2$ or **M1dep** for $4(their 2.5-1)$ or $2\times their 2.5+5$ OR **B1** for $\sqrt{20x^2-12x+41}$ and **M1dep** for substituting x = *their* 2.5 into $\sqrt{20x^2-12x+41}$ at any stage
5(a)	–3, 17	**2**	**B1** for each
5(b)	Fully correct curve	**4**	**B3 FT** for 10 or 11 points or **B2 FT** for 8 or 9 points or **B1 FT** for 6 or 7 points
5(c)(i)	Correct ruled tangent for *their* curve through (0, −17)	**1**	
5(c)(ii)	(1.7 to 2.2, –1 to 2.5)	**1**	
5(c)(iii)	[y =] $9x$ – 17 final answer	**3**	**M2dep** for answer [y =] $9x$[+] – c OR **M1dep** for gradient = $\frac{rise}{run}$ for *their* tangent at any point **B1** for answer [y =] kx[+] – 17 ($k \neq 0$)
5(d)	$y = 3x + 2$ ruled correctly and –2.2 … to –2.1 –0.6 to –0.4 2.6 to 2.8	**4**	**B2** for $y = 3x + 2$ ruled or **B1** for [y =] $3x + 2$ soi or $y = 3x + k$ ruled or $y = kx + 2$ but not $y = 2$ **B2** for all 3 values or **B1** for 2 values
6(a)	0.6	**1**	
6(b)	50.7	**3**	**M2** for $1.2 \times 19 + \frac{1}{2}(19 + 12) \times 1.8$ oe or **M1** for method for finding any relevant area
6(c)	17.9	**3**	**M2** for *their* $50.7 – 1.2 \times 19$ [– 10] oe or **M1** for 1.2×19 oe seen isw
7(a)	29	**1**	
7(b)	128	**2**	**FT** 180 – 2 (55 – *their* **(a)**) **M1** for angle *OCA* or angle *OAC* = 55 – *their* **(a)** soi

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Question	Answer	Marks	Partial Marks
7(c)	64	**1**	**FT** *their* **(b)** ÷ 2
7(d)	116	**1**	**FT** 180 – *their* **(c)**
8(a)	370 or 370.2 to 370.3	**2**	**M1** for 864 ÷ *their* time
8(b)	991 or 990.5 …	**4**	**M2** for $864^2 + 928^2 - 2 \times 864 \times 928\cos 67$ or **M1** for correct implicit version **A1** for 981100 to 981110
8(c)(i)	313	**2**	**M1** for 180 + 133 or 360 – 47
8(c)(ii)	[0]79.5 to [0]79.6 …	**4**	**M2** for $\frac{928\times\sin 67}{\textit{their}\ 991}$ or $\frac{864\times\sin 67}{\textit{their}\ 991}$ oe or **M1** for implicit form of either **A1** for [angle *HGB* =] 59.5 to 59.6 … or [angle *HBG* =] 53.4 or 53.37 to 53.42 **M1 dep** for *their* angle *HGB* + 20 leading to answer or for 133 – *their* angle *HBG* leading to answer
9(a)(i)	42.8 or 42.79 … nfww	**4**	**M1** for mid-values soi **M1** for Σ*fm* where *m* is any value in interval including boundaries **M1** (dep on second **M1**) for *their* Σ*fm* ÷ 120
9(a)(ii)	Blocks of height 1.8 4.4 8 2.1 with correct widths	**4**	**B1** for each correct block If **B0**, **SC1** for correct frequency densities seen
9(b)	Valid general comment about distributions	**1**	e.g. [On average], shoppers spend less time shopping on Wednesday oe
10(a)(i)	75 000 × 60 × 20 oe	**M1**	Allow × 1200 for × 60 × 20
10(a)(ii)	16.4 or 16.36 …	**3**	**M2** for $\frac{9\times10^7\times100}{1000\times55\times10^4}$ oe or **B2** for answer 0.164 or 0.1636 … or **B1** for answer figs 164 or 1636 … or **M1** for figs 9 ÷ figs 55
10(a)(iii)	28.3 or 28.27 to 28.28	**3**	**M2** for $\frac{76}{360} \times 2\pi \times 8.5 + 2 \times 8.5$ oe or **M1** for $\frac{76}{360} \times 2\pi \times 8.5$ oe

Question	Answer	Marks	Partial Marks
10(b)(i)	3770 or 3769 to 3770. …	**2**	**M1** for $\frac{1}{3}\times\pi\times10^2\times36$
10(b)(ii)	3.68 or 3.683 to 3.684 …	**4**	**M3** for $[r^3=]\ \frac{1}{2}\times$ *their* **(b)(i)** $\times\ \frac{3}{4\pi\times9}$ oe or **M2** for $\frac{4\pi r^3}{3}+\frac{4\pi(2r)^3}{3}=\frac{1}{2}\times$ *their* **(b)(i)** or for $\frac{4\pi r^3}{3}=\frac{1}{1+8}\times\frac{1}{2}\times$ *their* **(b)(i)** or **M1** for $\frac{4\pi r^3}{3}+\frac{4\pi(2r)^3}{3}$ or $\frac{1}{2}\times\frac{\pi\times10^2\times36}{3}$ or $\frac{1}{2}$ *their* **(b)(i)** seen or ratio of vols = $1:2^3$ oe seen
11(a)(i)	$\begin{pmatrix}-19\\-2\end{pmatrix}$	**2**	**B1** for answer $\begin{pmatrix}-19\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$ or for $\begin{pmatrix}-9\\6\end{pmatrix}$ or $\pm\begin{pmatrix}10\\8\end{pmatrix}$ seen
11(a)(ii)	3.61 or 3.605 to 3.606	**2**	**M1** for $\sqrt{([-]3)^2+2^2}$ oe
11(a)(iii)	$-3m+5n=14$ and $2m+4n=9$	**B1**	Accept equivalents
	$[m=]-\frac{1}{2}$ or -0.5 and $[n=]\ 2\frac{1}{2}$ or 2.5 or $\frac{5}{2}$ with evidence of a correct algebraic method	**4**	**M1** for correctly equating one set of coefficients of *their* equations or rearranges one of *their* equations to make *m* or *n* the subject e.g. $[m=]\ \frac{1}{2}(9-4n)$ oe **M1** for correct method to eliminate one variable for *their* equations or correctly substitutes *their m* or *their n* into the other equation e.g. $-\frac{3(9-4n)}{2}+5n=14$ oe **B1** for one correct answer
11(b)(i)(a)	$-\mathbf{a}+2\mathbf{c}$	**1**	
11(b)(i)(b)	$\frac{3}{8}(-\mathbf{a}+2\mathbf{c})$ or $-\frac{3}{8}\mathbf{a}+\frac{3}{4}\mathbf{c}$ oe	**1**	**FT** $\frac{3}{8}$ (*their* **(b)(i)(a)**) in simplest form

Question	Answer	Marks	Partial Marks
11(b)(i)(c)	$\frac{1}{2}(5\mathbf{a}-2\mathbf{c})$ or $\frac{5}{2}\mathbf{a}-\mathbf{c}$ oe	**1**	
11(b)(i)(d)	$\frac{1}{8}(5\mathbf{a}-2\mathbf{c})$ or $\frac{5}{8}\mathbf{a}-\frac{1}{4}\mathbf{c}$ oe	**2**	**M1** for a correct unsimplified route
11(b)(ii)	4	**1**	
12(a)(i)	$\frac{10}{20}\times\frac{9}{19}$ oe	**M2**	**B1** for $\frac{9}{19}$ oe seen
12(a)(ii)	$\frac{62}{95}$ oe	**4**	**M3** for $\frac{6}{20}\times\frac{14}{19}+\frac{10}{20}\times\frac{10}{19}+\frac{4}{20}\times\frac{16}{19}$ oe or $1-\frac{6}{20}\times\frac{5}{19}-\frac{10}{20}\times\frac{9}{19}-\frac{4}{20}\times\frac{3}{19}$ oe or **M2** for the sum of two products of different flavours isw or **M1** for one correct product of different flavours isw
12(b)	$\frac{5}{57}$ oe	**3**	**M2** for $N\times\left(\frac{4}{20}\times\frac{3}{19}\times\frac{16}{18}\right)+\frac{4}{20}\times\frac{3}{19}\times\frac{2}{18}$ oe or for $3\left(\frac{4}{20}\times\frac{3}{19}\times\frac{16}{18}\right)$ oe or $1-\{N\times\left(\frac{4}{20}\times\frac{16}{19}\times\frac{15}{18}\right)+\frac{16}{20}\times\frac{15}{19}\times\frac{14}{18}\}$ oe or **M1** for $\frac{4}{20}\times\frac{3}{19}\times\frac{k}{18}$ oe seen

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