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Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 42 (Extended) **March 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.

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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)	23.27 final answer	**2**	**M1** for 9×2.97 soi
1(a)(ii)	2.75 final answer	**3**	**M2** for $2.97 \div \frac{108}{100}$ oe or **M1** for 108[%] associated with 2.97 oe
1(b)	12.4[0] or 12.41 to 12.42	**2**	**M1** for $35 \div 0.0153$ oe If 0 scored, **SC1** for answer 0.19
1(c)	70 nfww	**3**	**M2** for $(600 + 2.5) \div (9 - 0.5)$ or **B1** for one of $600 + 2.5$ or $9 - 0.5$ seen
2(a)	128	**2**	**M1** for $4 \times \frac{1}{2} \times 8 \times 8$ oe
2(b)(i)	18.3 or 18.26 to 18.29…	**3**	**M2** for $\frac{1}{4}(\pi \times 8^2 - \textit{their}128)$ oe or **M1** for $\pi \times 8^2 - \textit{their}128$ oe or for $\frac{1}{4} \times \pi \times 8^2$ oe OR **SC2dep** for answer 4.56 to 4.57...
2(b)(ii)	23.9 or 23.87 to 23.882	**4**	**M3** for $\frac{90}{360} \times 2 \times \pi \times 8 + \sqrt{8^2 + 8^2}$ oe OR **M1** for $\frac{90}{360} \times 2 \times \pi \times 8$ oe **M1** for $\sqrt{128}$ oe OR **SC3dep** for answer 11.9 or 11.93 to 11.94…
3(a)	0 –0.17 2.4	**3**	**B1** for each
3(b)	Fully correct smooth curve	**4**	**B3FT** for 9 or 10 correct points or **B2FT** for 7 or 8 correct points or **B1FT** for 5 or 6 correct points
3(c)	$x \leqslant 0.17$ to 0.25 and $x \geqslant 2.25$ to 2.3	**3**	**B2** for strict inequalities or one correct or **B1** for 0.17 to 0.25 and 2.25 to 2.3 seen

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Question	Answer	Marks	Partial Marks
3(d)(i)	$y = 4 - x$ oe final answer	**2**	**B1** for $4 - x$ or $y = k - x$ or $y = 4 + kx$ oe
3(d)(ii)	correct ruled line	**1**	**FT** if in form $y = mx + c$ oe ($m, c \neq 0$)
	0.125 to 0.2 and 2.15 to 2.2	**2**	**B1** for each
4(a)	$[\pm]\sqrt{k-s}$ final answer	**2**	**M1** for $t^2 = k - s$
4(b)(i)	$(x-5)(x+5)$ final answer	**1**	
4(b)(ii)	$\frac{x-5}{x-7}$ nfww final answer	**3**	**M2** for $(x-7)(x+5)$ or **M1** for $x(x+5) - 7(x+5)$ or $x(x-7) + 5(x-7)$ or $(x + a)(x + b)$ where $a + b = -2$ or $ab = -35$
4(c)	$\frac{4x^2 - 7x - 8}{x(x+1)}$ or $\frac{4x^2 - 7x - 8}{x^2 + x}$ final answer	**3**	**M1** for $(x-8)(x+1) + 3x \times x$ oe isw **B1** for common denominator $x(x+1)$ oe isw
4(d)	3, 4, 5, 6 nfww	**3**	**B2** for 3 correct or 4 correct and 1 extra or **M2** for $n > \frac{18}{8}$ oe and $n \leqslant 6$ or **M1** for $18 < 8n$ [$\leqslant 30 + 3n$] or [$18 - 3n <$] $5n \leqslant 30$ seen
5(a)(i)	1930 or 1940 or 1933.4 to 1935.3	**5**	**B1** for interior angle 120 soi or angle at centre 60 soi or for correct use of Pythagoras' with 7 and 3.5 or with 14 and 7 **M3** for $6 \times \frac{1}{2} \times 7^2 \times \sin 60 \times 15.2$ oe or complete other methods or **M2** for $6 \times \frac{1}{2} \times 7^2 \times \sin 60$ oe OR **M1** for $\frac{1}{2} \times 7^2 \times \sin 60$ oe or other partial area of hexagon **M1dep** for *their* area × 15.2 evaluated

Question	Answer	Marks	Partial Marks
5(a)(ii)	893 or 892.8 to 893.0…	**3**	**M2** for $6 \times 7 \times 15.2 + 2 \times 6 \times \frac{1}{2} \times 7^2 \times \sin 60$ oe or for $6 \times 7 \times 15.2 + 2 \times$ *their* area of hexagon from **(a)** oe or **M1** for [6 ×] 7 × 15.2 oe or 2 × *their* area of hexagon from **(a)** oe
5(b)	2.71 or 2.709 to 2.710	**3**	**M2** for $\sqrt[3]{500 \div \left(6 \times \frac{4}{3}\pi\right)}$ oe or **M1** for $500 = 6 \times \frac{4}{3}\pi r^3$ oe If 0 scored, **SC1** for answer 4.92 or 4.923 to 4.924
6(a)	$y > x$	**1**	
	$x \geqslant 15$	**1**	
	$y < 50$	**1**	
	$x + y \leqslant 70$	**1**	
6(b)	Four correct ruled lines and correct region indicated	**5**	all lines ruled **B1** for $y = x$ broken **B1** for $x = 15$ **B1** for $y = 50$ broken **B1** for $x + y = 70$
6(c)	189	**2**	**M1** for (21, 49) seen or for $2x + 3y$ written for a point (x, y) in *their* region where x and y are integers
7(a)(i)	$\frac{9}{160}$ oe	**1**	
7(a)(ii)	58.125 nfww	**4**	**M1** for mid-points soi **M1** for use of Σfx with x in correct interval including both boundaries **M1** (dep on 2nd M1) for $\Sigma fx \div 160$
7(b)	[3 42] 85 140 151 160	**2**	**B1** for 1 error **FT** other values

Question	Answer	Marks	Partial Marks
7(c)	correct curve	**3**	**B1FT** *their* **(b)** for 6 correct heights **B1** for 6 points at upper ends of intervals on correct vertical line **B1FT dep on at least B1** for increasing curve through *their* 6 points After 0 scored, **SC1** for *their* 5 correct points plotted
7(d)(i)	57 to 59	**1**	
7(d)(ii)	36 to 42	**2**	**B1** for UQ = 76 to 80 or LQ = 38 to 40 soi
7(d)(iii)	92 to 94	**2**	**B1** for 144 seen
7(d)(iv)	130 to 137	**2**	**B1** for 23 to 30 seen
8(a)	356 or 356.2 to 356.3	**4**	**B1** for [Angle *LPM*] = 74 soi **M2** for $\frac{248 \times \sin \textit{their } 74}{\sin 42}$ oe or **M1** for implicit statement
8(b)(i)	320 or 319.9 to 320.2...	**3**	**B1** for angle *PLM* = 64 soi or for angle between *LM* and perpendicular from *M* = 26 soi or [*PM* =] 333.[1…] **M1** for *their* 356 × sin *their* 64 oe or *their* 356 × cos *their* 26 oe
8(b)(ii)	02 57 or 2 57 am	**3**	**B2** for 6 hours 12 mins or 372 mins seen or **M1** for 248 ÷ 40 oe If 0 scored, **SC1** for *their* time in hours converted to hours and minutes
9(a)	7.07 or 7.071...	**2**	**M1** for $(-1)^2 + 7^2$ oe
9(b)	–6	**2**	**M1** for $6 \times m - 5 \times 2m$ [= 24]
9(c)(i)	(10) final answer	**2**	**B1** for answer 10 without brackets
9(c)(ii)	$\begin{pmatrix} 2 \\ 6 \end{pmatrix}$ final answer	**2**	**M1** for $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 6 \end{pmatrix}$
9(c)(iii)	$\begin{pmatrix} 19 & 55 \\ 33 & 96 \end{pmatrix}$ final answer	**2**	**M1** for 2 or 3 correct elements
9(c)(iv)	$\frac{1}{3}\begin{pmatrix} 9 & -5 \\ -3 & 2 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} 9 & -5 \\ -3 & 2 \end{pmatrix}$ soi or det = 3 soi

Question	Answer	Marks	Partial Marks
10(a)	10.8 or 10.81 to 10.82	**3**	**M2** for $\sqrt{(6--3)^2+(-2-4)^2}$ oe or **M1** for $(6--3)^2+(-2-4)^2$ oe
10(b)(i)	(6, 4)	**2**	**B1** for each
10(b)(ii)	2	**2**	**M1** for $\frac{12-(-4)}{10-2}$ oe
10(b)(iii)	$y=-\frac{1}{2}x+4$ oe final answer	**3**	**M1** for gradient = $-\frac{1}{2}$ or $-\frac{1}{\textit{their}\ \textbf{(b)(ii)}}$ **M1** for (2, 3) substituted into *their* $y=mx+c$ or $y-y_1=m(x-x_1)$ oe
11(a)	25 9 16	**3**	**B1** for each
11(b)(i)	$(n-1)^2$ oe	**2**	**B1** for any quadratic of form [1]n^2[+bn+c]
11(b)(ii)	$n+3$ oe	**1**	
11(c)	25	**2**	**M1** for *their* $(n-1)^2=576$
11(d)(i)	n^2-3n-2 final answer	**3**	**M1** for *their*$(n-1)^2$ − *their*$(n+3)$ oe or 2nd diff = 2 soi **B1** for $n^2-n-n+1$ or better or $-n-3$ or for expression of form $n^2-2n-n+k$ or correct expression not in simplest form
11(d)(ii)	808 cao	**2**	**M1** for substituting 30 in *their* **(d)(i)**

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