Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **October/November 2019**

MARK SCHEME

Maximum Mark: 120

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.

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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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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

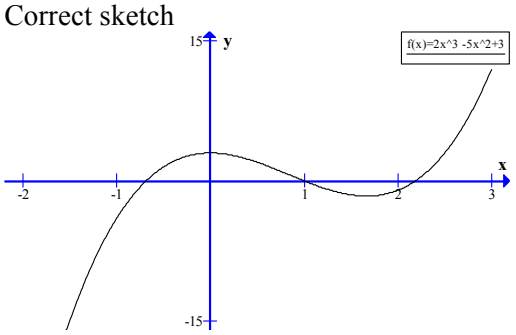
B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

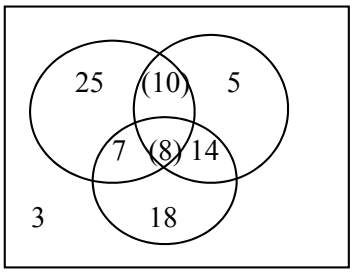
Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

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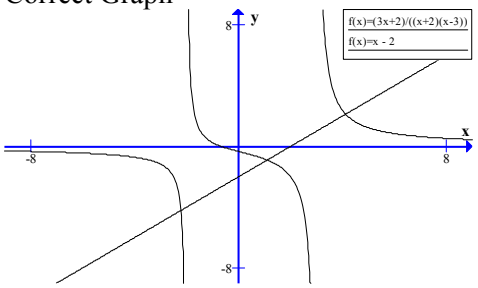
Question	Answer	Marks	Partial Marks
1(a)	13 770.28	**3**	**M2** for $12\,000 \times \left(1+\frac{3.5}{100}\right)^4$ oe or **M1** for $12\,000 \times \left(1+\frac{3.5}{100}\right)^k$, $k > 1$ oe
1(b)	9500	**3**	**M2** for $10\,078.55 \div \left(1+\frac{3}{100}\right)^2$ oe or **M1** for $10\,078.55 \div \left(1+\frac{3}{100}\right)^n$ oe
1(c)	17 000	**3**	**M2** for $Q + \frac{Q\times 4\times 5}{100} = 20\,400$ oe or **M1** for $\frac{Q\times 4\times 5}{100}$ oe soi by e.g. $0.2Q$ If 0 scored, **SC1** for 16 800 or 16 760 to 16 770
2(a)	1	**1**	
2(b)	7	**1**	
2(c)	2	**1**	
2(d)	2	**2**	**B1** for 1 or 3 seen but not final answer
2(e)	2.22	**2**	**M1** for $(0 \times 17 + 1 \times 23 + 2 \times 20 + ...) \div 100$
3(a)	Correct sketch 	**2**	**B1** for cubic curve ($+x^3$) with 2 turning points
3(b)	–0.686 or –0.6861..., 1, 2.19 or 2.186...	**3**	**B1** for each If 0 scored, **SC1** for three correct but in coordinate form (…, 0)
3(c)	(0, 3)	**1**	

Question	Answer	Marks	Partial Marks
3(d)	(1.67, –1.63) or (1.666 to 1.667, –1.630 to –1.629)	**2**	**B1** for each co-ordinate
3(e)	$-1.63 < k < 3$	**2**	**FT** *their y* co-ords from **(c)** and **(d)** **B1** for each
4(a)	5 points plotted correctly	**2**	**B1** for 3 or 4 points correct
4(b)	Positive	**1**	
4(c)	$p = 0.78[0]m + 10.4$	**2**	0.7798 to 0.7799, 10.35... **B1** for $p = 0.780m + c$ or $p = km + 10.4$
4(d)	54	**1**	**FT** *their* 0.780×56 + *their* 10.4
4(e)	$[p =] 0.78[0]m + 15.4$ oe	**1**	**FT** *their* **(c)**
5(a)	Triangle at (2, 0), (2, –4), (4, –4)	**2**	**B1** for reflection in $y = k$ or $x = 1$
5(b)	Triangle at (0, 2), (–2, 2), (–2, 3)	**3**	**B2** for Rotation 90° anti-clockwise about (1, 0) or **B1** for Rotation 90° clockwise about any centre.
5(c)	Enlargement [Scale factor] $-\frac{1}{2}$ oe [Centre] (0, 0) oe	**3**	**B1** for each
5(d)	Stretch [Stretch factor] 3 Invariant [line] *y*-axis oe	**3**	**B1** for each
6(a)	(11, –9)	**2**	**B1** for each co-ordinate
6(b)(i)	$-\mathbf{a} + \mathbf{b}$	**1**	
6(b)(ii)	$\frac{3}{7}\mathbf{a} + \frac{4}{7}\mathbf{b}$ or $\frac{1}{7}(3\mathbf{a} + 4\mathbf{b})$	**3**	**B2** for unsimplified or **B1** for $\overrightarrow{OA} + \frac{4}{7}\overrightarrow{AB}$ oe or a correct route
7(a)(i)	134 or 134.0 to 134.1	**2**	**M1** for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 4^3$ oe
7(a)(ii)	101 or 100.5...	**2**	**M1** for $\frac{1}{3} \times \pi \times 4^2 \times 6$ oe

Question	Answer	Marks	Partial Marks
7(a)(iii)	1120 or 1117 to 1118	**2**	**M1** for $\frac{2}{3} \times \pi \times 4^3 \times 7.85$ soi or *their* **(i)** × 7.85 or for $\frac{1}{3} \times \pi \times 4^2 \times 6 \times 0.65$ soi or *their* **(ii)** × 0.65
7(b)	191 or 191.1 to 191.2	**5**	**M1** for $6^2 + 4^2$ **A1** for 7.21 or 7.211... or $\sqrt{52}$ **M1** for $\pi \times 4 \times$ *their* 7.21 **M1** for $2 \times \pi \times 4^2$
7(c)	430 or 429.7 to 430.2	**2**	**FT** *their* **(b)** **M1** for *their* **(b)** $\times \left(\frac{9}{6}\right)^2$ oe
8(a)	Correct Diagram 	**2**	Condone 3 omitted from outside region **B1** for 3 subsets correct
8(b)	3	**1**	
8(c)	$\frac{90}{8010}$ oe	**2**	**M1** for $\frac{10}{90} \times \frac{9}{89}$
8(d)	$\frac{140}{2450}$	**3**	**M2** for $\frac{10}{50} \times \frac{\textit{their}\,7}{49} + \frac{\textit{their}\,7}{50} \times \frac{10}{49}$ oe or **M1** for one of these products
9(a)	$14^2 + 12^2 - 2 \times 14 \times 12 \times \cos 58$	**M1**	
	12.725 to 12.726	**A2**	or **A1** for 161.9...
9(b)	Angle at centre = 2 × angle at circumference oe	**1**	
9(c)	7.49 or 7.5[0] or 7.51 or 7.487 to 7.506	**3**	**M2** for $\frac{6.365}{\sin 58}$ oe or **M1** for $\sin 58 = \frac{6.365}{OB}$ oe

Question	Answer	Marks	Partial Marks
9(d)	31.3 to 31.9 nfww	**3**	**M2** for $\frac{116}{360} \times \pi \times (\textit{their}\ \textbf{(c)})^2$ $-\frac{1}{2} \times (\textit{their}\ \textbf{(c)})^2 \times \sin 116$ oe or **M1** for $\frac{116}{360} \times \pi \times (\textit{their}\ \textbf{(c)})^2$ oe or $\frac{1}{2} \times (\textit{their}\ \textbf{(c)})^2 \times \sin 116$ oe
10(a)	$\frac{840}{2x+3}$	**1**	
10(b)	$2(2x+3) + 2\ \textit{their} \times \frac{840}{2x+3} = 118$ oe	**M1**	
	$2(2x+3)^2 + 1680 = 118(2x+3)$ oe	**M1**	Clearing fractions
	Correct completion to $2x^2 - 53x + 336 = 0$	**A1**	No errors or omissions
10(c)	$(2x-21)(x-16) = 0$	**M1**	or $x = \frac{-(-53) \pm \sqrt{(-53)^2 - 4(2)(336)}}{2 \times 2}$ or sketch of parabola (+ve x^2, +ve zeros)
	10.5, 16	**B2**	**B1** for each
10(d)	35 24	**2**	**B1** for each If 0 scored, **SC1** for a pair of values with a product of 840 or a sum of 59
11(a)(i)	a^6 final answer	**2**	**B1** for a^9 or $a^2 \times a^4$ or $a^5 \times a^{[1]}$
11(a)(ii)	x	**1**	
11(a)(iii)	$\frac{1}{2}x$ oe	**1**	
11(b)	40	**2**	**M1** for one correct use of $a\log b = \log b^a$ or for correct use of $\log a - \log b = \log(a \div b)$

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Question	Answer	Marks	Partial Marks
12(a)	Correct Graph 	**3**	**B1** for each branch
12(b)	$x = -2$ $x = 3$ $y = 0$	**3**	**B1** for each
12(c)(i)	Correct line , See **(a)**	**1**	
12(c)(ii)	–2.21 or –2.211... 1.1[0] or 1.100... 4.11 or 4.111...	**3**	**B1** for each
12(c)(iii)	$x < -2.21$ $-2 < x < 1.1[0]$ $3 < x < 4.11$	**3**	**FT** from **(ii)** if graphs are correct **B1** for each
13(a)	9	**1**	
13(b)	–6	**2**	**M1** for $f(x) = -7$ or for $f^{-1}(x) = \frac{x-5}{2}$
13(c)	–21	**2**	**B1** for 11 seen or **M1** for $1 - 2(2x + 5)$
13(d)	$7 - 4x$	**2**	**M1** for $2(1 - 2x) + 5$
13(e)	$\frac{1-x}{2}$ oe	**2**	**M1** for $2x = 1 - y$ or $x = 1 - 2y$ or $\frac{y}{2} = \frac{1}{2} - x$
13(f)	$\frac{4x+13}{2x+5}$ final answer	**2**	**M1** for $\frac{2(2x+5)+3}{2x+5}$