Cambridge Assessment International Education

Cambridge IGCSE™

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **October/November 2020**

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 2020 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **9** printed pages.

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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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Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

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.

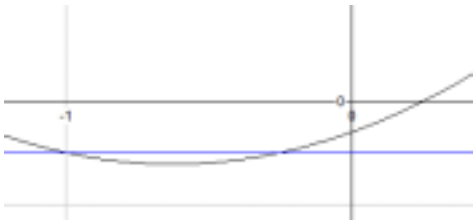
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier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

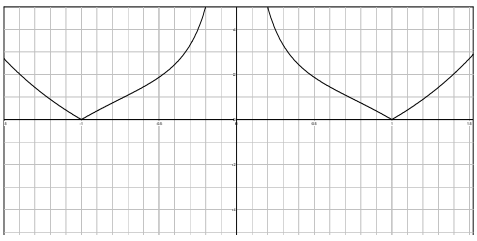
Abbreviations

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)	positive	**1**	
1(b)(i)	61.2	**1**	
1(b)(ii)	66	**1**	
1(c)(i)	$[y =]\ 28.7 + 0.61[0]x$	**2**	**B1** for $[y =]\ 28.7 + kx$ or $[y =]k + 0.61[0]x$ or $29 + 0.6[1]x$
1(c)(ii)	53 or 53.1	**1**	**FT** *their* **(i)**
2(a)(i)	25.0 cao	**1**	
(a)(ii)	25.0 cao	**1**	
(a)(iii)	30	**1**	
(a)(iv)	25.047	**1**	
(a)(v)	$2.50467 \times 10^{[1]}$	**1**	
(b)(i)	0.2[0] oe	**1**	
(b)(ii)	200 000	**1**	
(b)(iii)	5	**2**	**M1** for $\times 1000 \div 3600$
3(a)	Correctly equating one set of coefficients or correctly expressing one variable in terms of the other	**M1**	
	Correct method to eliminate one variable	**M1**	
	$[x =] -1$	**A1**	
	$[y =] -2$	**A1**	If 0 scored **SC1** for correct substitution into one of original equations and evaluation to find other variable, or for 2 correct answers with no working

Question	Answer	Marks	Partial Marks
3(b)	Algebraic method. $8x^2 + 12x - 2x - 3$ [$= -5$]	**M1**	Correct Expansion
	$8x^2 + 10x + 2 = 0$ or better	**M1**	Correctly equating *their* quadratic to zero
	$(4x+1)(2x+2)$ [$= 0$] oe $(8x + 2)(x + 1)$ [$= 0$]	**M1**	or correct use of formula with *their* 3 term quadratic or correct sketch of parabola
	[$x =$] –1 and [$x =$] –0.25 oe	**B2**	**A1 dep on 3rd M1** for either
	OR GDC method 	**M3**	**M2** for parabola intersecting $y = -5$ twice or **M1** for parabola OR **M3** for correct graph of *their* rearranged equation
	[x=] –1and [x=] –0.25 oe	**B2**	**A1** for either
4(a)(i)	Rotation, [Centre] (0, 0) [Anticlockwise] 90 or clockwise 270	**3**	**B1** for each
4(a)(ii)	Enlargement [Scale factor] 2 [Centre] (–1, –1)	**3**	**B1** for each
4(a)(iii)	Correct triangle (2, 1) (6, 1) (6, 2)	**2**	**B1** for correct stretch with x-axis invariant or **B1** for correct SF in wrong position
4(b)(i)	Reflect $y = 2$	**1**	
4(b)(ii)	Translation $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$	**2**	**B1** for each
5(a)	90	**1**	
5(b)	94	**2**	**M1** for $180 - 43 - 43$ or 2×47

Question	Answer	Marks	Partial Marks
5(c)	22	**2**	**B1** for *CAB* = 65 or *ACB* = 47
5(d)	112	**2**	**M1** for 180 – *their ABC*
5(e)	34	**2**	**FT** *their* **(d)** **M1** for (180 – *their***(d)**)/2
5(f)	16	**2**	**B1** for *BCT* = 99
6(a)	0	**B1**	
	$(6-n)^3$ oe $216-108n+18n^2-n^3$	**B2**	**M1** for $f(n^3)$
6(b)	56	**B1**	
	n^2+3n+2 oe	**B3**	**M2** for n^2+an+b , a, b numeric $\neq 0$ oe or **M1** for $f(n^2)$ or for common difference of 2
7(a)	Correct sketch 	**3**	**B1** for modulus graph **B1** for correct for $x > 1$, or $-1 < x < 0$ **B1** for $x = -1$ and 1 when $y = 0$ plotted correctly. Maximum 2 marks if sketch not fully correct
7(b)	$x = 0$	**1**	
7(c)	–1.4[0] or –1.395… –0.475 or –0.4746…	**2**	**B1** for each
7(d)	$-1.15 \leqslant x \leqslant -0.536$ or —1.154 to –1.153...$\leqslant x \leqslant$ –0.5357 to –0.5356 AND $0.536 \leqslant x \leqslant 1.15$ or 0.5356 to 0.5357 $\leqslant x \leqslant$ 1.153 to 1.154	**3**	**B2** for one fully correct inequality or **B1** for $-1.15 \leqslant x \leqslant -k$ $-k \leqslant x \leqslant -0.536$ or $0.536 \leqslant x \leqslant k$ $k \leqslant x \leqslant 1.15$ or **M1** for suitable sketch, e.g. $f(x) + x^2 \leqslant 2$ or **B1** for 4 correct solutions seen
8(a)	21.5 or 21.54…	**2**	**M1** for 20^2+8^2
8(b)	8.94 or 8.944…	**2**	**M1** for 12^2-8^2

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Question	Answer	Marks	Partial Marks
8(c)	48.2 or 48.15 to 48.19...	**2**	**M1** for $\cos[x] = \frac{8}{12}$ oe
8(d)	22.5 or 22.6 or 22.54 to 22.59	**2**	**M1** for $\tan[x] = \frac{\sqrt{12^2 - 8^2}}{\sqrt{20^2 + 8^2}}$ oe or $\tan[x] = \frac{their(b)}{their(a)}$ oe
9(a)(i)	4870 or 4869 to 4870	**3**	**M1** for $24 \times 16 \times 12$ **M1** for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 5^3$
9(a)(ii)	1050 or 1051 to 1052 nfww	**2**	**M1** for $\left(\frac{3}{5}\right)^3$ oe or $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3^3 + 14.4 \times 9.6 \times 7.2$
9(b)(i)	1810 or 1806 to 1807	**3**	**M1** for $24 \times 16 \times 2 + 24 \times 12 \times 2 + 16 \times 12 \times 2$ $[-\pi \times 5^2]$ **M1** for $0.5 \times 4 \times \pi \times 5^2$
9(b)(ii)	2600 or 2610 or 2600 to 2606. ... nfww	**2**	**M1** for $\left(\frac{6}{5}\right)^2$ oe soi or $0.5 \times 4 \times \pi \times 6^2 + 28.8 \times 19.2 \times 2 + 28.8 \times 14.4 \times 2 + 19.2 \times 14.4 \times 2 - \pi \times 6^2$
10(a)	11.2 or 11.19 to 11.20	**3**	**M2** for $\sqrt{8.1^2 + 9.6^2 - 2 \times 8.1 \times 9.6 \times \cos 78}$ OR **M1** for $8.1^2 + 9.6^2 - 2 \times 8.1 \times 9.6 \times \cos 78$ **A1** for 125 or 125.4...
10(b)	$\sin DAC = \frac{9.6 \times \sin 78}{their\textbf{(a)}}$ oe	**M2**	**M1** for $\frac{9.6}{\sin DAC} = \frac{their\textbf{(a)}}{\sin 78}$ oe
	56.97 to 57.05...	**A1**	
10(c)	14.8 or 14.79 to 14.81	**3**	**M2** for $BC = \frac{their\textbf{(a)} \times \sin(57 + 15)}{\sin 46}$ or **M1** for $\frac{BC}{\sin(57 + 15)} = \frac{their\textbf{(a)}}{\sin 46}$ oe

Question	Answer	Marks	Partial Marks
10(d)	35.0 to 35.3	**4**	**B1** for angle $ACB = 62$ soi **M1** for area $ABC = 0.5 \times$ *their* **(a)** $\times$ *their* **(c)** $\times \sin$ *their* (62) or $0.5 \times$ *their* **(c)** $\times$ (13.7 or 13.74 to 13.75) $\times \sin 46$ or $0.5 \times$ *their* **(a)** $\times$ (13.7 or 13.74 to 13.75) $\times \sin(57 + 15)$ **M1** for area $ADC = 0.5 \times 8.1 \times 9.6 \times \sin 78$ oe
11(a)(i)	$\frac{7}{12}$ oe	**1**	
11(a)(ii)	840	**1**	**FT** *their* **(i)**
11(b)(i)	$\frac{1}{16}$ oe	**2**	**M1** for $\frac{3}{12} \times \frac{3}{12}$
11(b)(ii)	$\frac{25}{72}$ oe	**3**	**M2** for $\frac{3}{12} \times \frac{3}{12} + \frac{4}{12} \times \frac{4}{12} + \frac{5}{12} \times \frac{5}{12}$ or **M1** for any one of these products seen
11(b)(iii)	$\frac{47}{72}$ oe	**1**	**FT** 1 – *their* **(ii)** or $\frac{4}{12} \times \frac{8}{12} + \frac{5}{12} \times \frac{7}{12} + \frac{3}{12} \times \frac{9}{12}$
11(c)(i)	$\frac{3}{44}$ oe	**3**	**M2** for $\frac{4}{12} \times \frac{5}{11} \times \frac{3}{10}$ or $\frac{3}{12} \times \frac{5}{11} \times \frac{2}{10}$ or **M1** for any product of three proper fractions with denominators 12, 11 and 10
11(c)(ii)	$\frac{12}{55}$ oe	**4**	**M3** for $\frac{4}{12} \times \frac{3}{11} \times \frac{8}{10} \times 3$ oe or **M2** for $\frac{4}{12} \times \frac{3}{11} \times \frac{8}{10}$ oe or **M1** for product of three fractions with numerators 4, 3, 8 oe

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Question	Answer	Marks	Partial Marks
12(a)	0.25 oe	**3**	**M2** for $8x = 2$ or $-2 = -8x$ or better or **M1** for $6x - 2 = -2x$ or $\frac{-2}{x} = -8$ oe OR **M2** for correct sketch that could lead to correct answer or **M1** for appropriate but incomplete sketch e.g. $6 - \frac{2}{x}$
12(b)	–2.8 oe	**3**	**M2** for $8x + 2x = 1 - 16 - 3 - 10$ oe or **M1** for $3 + 8x + 10$ or $1 - 2x - 16$
12(c)	2	**3**	**M1** for $\log x^3$ or $\log 3^2$ or $\log 6^2$ or better **M1** for correct use of $\log p - \log q = \log \frac{p}{q}$ or $\log p + \log q = \log pq$
12(d)	3.32 or 3.321 to 3.322	**3**	**B2** for $\frac{\log 10}{\log 2}$ or $\log_2 10$ or $\frac{1}{\log 2}$ or **M1** for $x \log 2 = \log 10$ OR **M2** for correct sketch that could lead to correct answer or **M1** for appropriate but incomplete sketch e.g. $y = 2^x$