Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **October/November 2018**

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 2018 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.

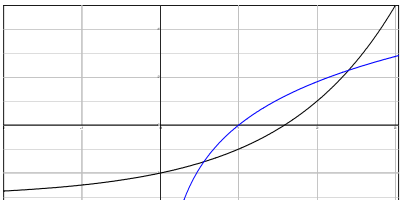
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier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

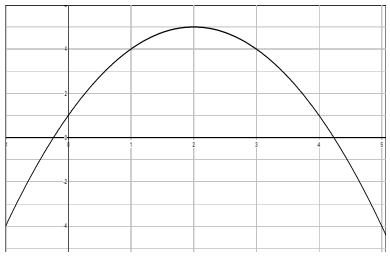
Abbreviations

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)(i)	$\frac{38}{83}$ cao	**2**	**M1** for $\frac{190}{225+190}$ implied by correct unsimplified fraction
1(a)(ii)	45 : 38 final answer	**2**	**M1** for 225 : 190 oe If 0 scored **SC1** for 38 : 45 final answer
1(b)	18	**2**	**M1** for 15 ÷ 5 soi by [1 part =] 3
1(c)(i)	45.5 or 45.45…	**1**	
1(c)(ii)	3	**2**	**M1** for $\frac{20}{100}$ × 15 oe
1(d)	375 nfww	**3**	**M2** for $390 \div \left(1+\frac{4}{100}\right)$ oe or **M1** for recognising 390 as 104%
2(a)	Rotation 90° clockwise oe (5, 1)	**3**	**B1**for each
2(b)	Correct reflection (– 1, 1), (– 4, 1), (– 4, 3)	**1**	
2(c)	Correct translation (6, 7), (9, 7), (9, 9)	**2**	**B1** for translation $\begin{pmatrix}5\\k\end{pmatrix}$ or $\begin{pmatrix}k\\6\end{pmatrix}$
2(d)	Correct stretch (1, 3), (4, 3), (4, 9)	**2**	**B1** for stretch factor 3 displaced vertically or stretch with *x*-axis invariant but other factor.
3(a)(i)	$\begin{pmatrix}1\\3\end{pmatrix}$	**1**	
3(a)(ii)	$\begin{pmatrix}4\\-2\end{pmatrix}$	**1**	
3(a)(iii)	4.47 or 4.472…	**2**	**FT** *their* **(ii)** **M1** for $(\textit{their } 4)^2 + (\textit{their } -2)^2$
3(b)(i)	$\begin{pmatrix}2\\5\end{pmatrix}$	**2**	**B1** for $\begin{pmatrix}2\\k\end{pmatrix}$ or $\begin{pmatrix}k\\5\end{pmatrix}$ If 0 scored, **SC1** for $\begin{pmatrix}2\\5\end{pmatrix}$
3(b)(ii)	$(6, 17)$	**2**	**B1** for (6, *k*) or (*k*, 17)

Question	Answer	Marks	Partial Marks
4(a)(i)	Correct sketch 	**3**	**B2** for correct shaped branches but branches joined or **B1** for one branch correct shape (even if branches connected)
4(a)(ii)	(0.707 or 0.7071… , 1.41 or 1.414…)	**2**	**B1** for (0.707 or 0.7071… , k) or for(k , 1.41 or 1.414…)
4(a)(iii)	f(x) $\geqslant$ 1.41 or 1.414….	**1**	**FT** *their* **(ii)**
4(a)(iv)	$x = 0$ $y = x$ oe	**2**	**B1** for each
4(b)(i)(a)	Correct sketches 	**2**	**B1** for increasing exponential graph with negative y-intercept.
4(b)(i)(b)		**2**	**B1** for correct shape all to right of y-axis and x-intercept not too far from 1.
4(b)(ii)	0.556 or 0.5559… $< x <$ 2.4[0] or 2.401…	**2**	**B1** for both correct values seen
5(a)	7.5 9	**2**	**B1** for each
5(b)	Positive	**1**	
5(c)	[y =]0.681 (or 0.6812…)x + 1.98 (or 1.982…)	**2**	**B1** for 0.681 (or 0.6812…)x + k or for kx + 1.98 (or 1.982…) or for 0.68x + 2[.0]
6(a)	96.9 or 96.90…	**2**	**M1** for 0.5 × 11 × 23 × sin50 oe
6(b)	18[.0] or 18.02…	**3**	**B2** for 325 or 324.7… or **M1** for $11^2 + 23^2 - 2\times11\times23\times\cos 50$ oe

Question	Answer	Marks	Partial Marks
7(a)	23 500	**3**	**B2** for 23 470 or 23 474. … or **M1** for $26\,010 \times \left(1-\frac{5}{100}\right)^2$ oe If 0 scored, **SC1** for 9300 or 9320 or 9324 or for *their* seen answer rounded to the nearest 100
7(b)(i)	25 000 cao nfww	**2**	**M1** for $26\,010 \div \left(1+\frac{2}{100}\right)^2$
7(b)(ii)	14 nfww	**4**	**M3** for $n\log(1.02) = \log\left(\frac{26010}{20000}\right)$ soi by 13 or 13.3 or 13.26 to 13.27 or for trial and improvement reaching $n = 13$ and 14 or **M2**for $(1.02)^n = \frac{26010}{20000}$ oe or for trial and improvement at least 3 times or **M1** for $26010 = 20000(1.02)^n$ oe
8(a)	Correct sketch 	**2**	**B1** for parabola vertex upwards but incorrect intersections with axes
8(b)	$x = 2$ oe	**1**	
8(c)(i)	– 0.236 or – 0.2361 to – 0.2360 4.24 or 4.236…	**2**	**B1** for each
8(c)(ii)	– 0.236 or – 0.2361 to – 0.2360 < x < 4.24 or 4.236…	**1**	**FT** *their* **(b)(i)**
8(d)	– 0.449 or – 0.4495 to – 0.4494 4.45 or 4.449…	**2**	**B1** for each If 0 scored, **B1** for $y = -1$ sketched
8(e)	Correct line sketched, passing through (5, 0)	**2**	**B1** for line with negative gradient or with y-intercept reasonably close to 5 but not through (0, 6)
8(f)	Region below curve **and** below line shaded, **continuing** below x-axis	**1**	

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Question	Answer	Marks	Partial Marks
9(a)	$\frac{11}{20}$ oe	**2**	**M1** for $1-\frac{1}{5}-\frac{1}{4}$
9(b)(i)	$\frac{2}{3}$ and $\frac{11}{20}$ correctly placed	**1**	**FT** *their* **(a)**
9(b)(ii)	$\frac{8}{15}$ oe	**3**	**M2** for $\frac{2}{3}\times\left(\frac{1}{4}+\textit{their}\frac{11}{20}\right)$ or $\frac{2}{3}\times\left(1-\frac{1}{5}\right)$ oe or $1-\frac{1}{3}-\left(\frac{2}{3}\times\frac{1}{5}\right)$ or **M1** for $\frac{2}{3}\times\left(\frac{1}{4}\right)$ or $\frac{2}{3}\times\left(\textit{their}\frac{11}{20}\right)$ or $\frac{1}{3}+\left(\frac{2}{3}\times\frac{1}{5}\right)$ or $\frac{1}{4}+\frac{11}{20}$
9(b)(iii)	48 final answer	**1**	**FT** *their* **(b)(ii)**
10(a)	60.3 or 60.25 to 60.26	**2**	**M1** for tan = $\frac{7}{4}$ oe
10(b)	54.5 or 54.46…	**3**	**M2** for tan = $\frac{7}{\frac{1}{2}\sqrt{6^2+8^2}}$ oe or **M1** for 6^2+8^2 or 3^2+4^2 oe
10(c)	8.6[0] or 8.602…	**2**	**M1** for $7^2+(\textit{their}\ 5)^2$ oe
10(d)	69.6 or 69.58 to 69.59	**2**	**M1** for cos = $\frac{3}{\textit{their}\ PC}$ oe
10(e)	6.49 or 6.493…	**3**	**M2** for $\frac{6\sin(\textit{their}\textbf{(d)})}{\sin 60}$ oe or **M1** for $\frac{\sin 60}{6}=\frac{\sin(\textit{their}\textbf{(d)})}{BX}$
11(a)	70, 80, 30	**2**	**B1** for 2
11(b)	156.25	**2**	**M1** for mid-values soi

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Question	Answer	Marks	Partial Marks
12(a)	4.75	**3**	**B2** for $8x = 38$ oe or **M1** for $2\{(3x + 2) + (x + 1)\} = 44$ or $(3x + 2) + (x + 1) = 22$
12(b)	17 cao	**3**	**B2** for 16 and 17 seen or sketch showing 17 or $(y+16)(y-17)$ seen or $\frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-272)}}{2(1)}$ oe or **B1** for 17 seen or **M1** for $y(y - 1) = 272$ or better or appropriate sketch but not indicating 17
12(c)	2.5 oe	**3**	**M2** for $vw = 5$ and $(v + 1)w = 7$ oe or **M1** for one of these equations oe
12(d)	1.69 or 1.690… only cao	**4**	**M3** for $6p^2 - 6p - 7[= 0]$ oe or **M2** for $2\left(2p + \frac{9}{2p}\right) + 2 = 2\left(3p + \frac{10}{3p}\right)$ oe or **M1** for $\frac{9}{2p}$ or $\frac{10}{3p}$ soi
13(a)	4	**1**	
13(b)(i)	$1 - 3x$ oe	**2**	**M1** for $3(1 - x) - 2$
13(b)(ii)	$5x$	**3**	**B2** for $-3x^2 + 3x + 2x - 2$ or **M1** for $(3x - 2)(1 - x) + 3x^2 + 2$
13(c)	$1 - x$ oe	**1**	
13(d)(i)	$\frac{4}{3}$ oe	**2**	**M1** for $3x - 2 = 2$
13(d)(ii)	± 1, $\pm\sqrt{7}$ nfww	**3**	**M1** for $x^2 - 4 = \pm 3$ oe (implied by 1 and $\sqrt{7}$) **A1 dep** on **M1** for two correct answers If 0 scored, **SC1** for $\pm\sqrt{7}$ or for ± 1

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