Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education (9–1)

MATHEMATICS **0626/04**

Paper 4 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 84

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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This document consists of **7** printed pages.

Cambridge Assessment
International Education

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.

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

Question	Answer	Marks	Partial Marks
1(a)	[0].006 25	1	
1(b)	6×10^4 final answer	2	**B1** for any equivalent to 6×10^4 seen e.g. $[0].6 \times 10^5$ or for 60 000 or $[0].06 \times 10^6$
2(a)	$3 \times 7 \times 11$	2	**M1** for a correct factor tree or list or for 3×77 or 21×11 or 7×33 seen
2(b)	5	2	**B1** for a time of 300 seen or **M1** for attempting to find the LCM of 75 and 100 oe
3	$9\frac{1}{3}$ cao	3	**B2** for an answer of $\frac{28}{3}$ or e.g. $9\frac{4}{12}$ or **B1** for $\frac{16}{3}$ or $\frac{7}{4}$ oe seen and **M1** dep for *their* $\frac{16 \times 7}{3 \times 4}$ oe attempted and **B1FT** for converting *their* improper fraction to a mixed number in its lowest terms Maximum 2 marks if answer incorrect
4	30	2	**M1** for $[n =] \dfrac{360}{12}$ oe
5	66 isw	2	**M1** for $\dfrac{11}{50} \times 300$ If 0 scored then **SC1** for an answer of 70
6(a)	1.5 oe	3	**M1** for expanding brackets correctly to e.g. $-2x + 6$ **M1** for correctly collecting terms on both sides to *their* $8x =$ *their* 12 **M1** for rearranging to $x = \dfrac{their 12}{their 8}$ where *their* 8 is not ± 1 and *their* 12 is not 0 Maximum 2 marks if answer incorrect
6(b)	0, 4	2	**B1** for each or **M1** for $x(x - 4)$ [$= 0$] seen
7(a)(i)	1	1	
7(a)(ii)	8	1	

Question	Answer	Marks	Partial Marks
7(a)(iii)	144	**2**	**B1** for 12^2 oe or **M1** for 12^{5-3} seen
7(b)	No with valid reason	**1**	
8(a)	19	**2**	**M1** for $5n = 95$ oe
8(b)	$3n^3$ oe	**2**	**M1** for a cubic expression
9	$y = \dfrac{1}{2}x - 1$ final answer	**3**	**B2** for correct answer in the wrong form or for $y = \dfrac{1}{2}x + c$, where c may be numerical other than -1 or algebraic or **B1** for $y = mx - 1$, where m may be numerical other than $\dfrac{1}{2}$ or algebraic and **M1** for correct grad = $\dfrac{rise}{run}$ calculation seen
10	correct angle bisector with correct arcs	**2**	**M1** for correct bisector with incorrect or no arcs or 2 correct pairs of arcs seen
	correct perpendicular bisector with correct arcs	**2**	**M1** for correct bisector with incorrect or no arcs or 2 correct pairs of arcs seen
	correct region shaded	**1**	**FT** *their* angle bisector and *their* perpendicular bisector
11	30	**2**	**B1** for any two numbers rounded correctly, seen
12(a)	$x = 0.\dot{3}\dot{1}$ and $100x = 31.\dot{3}\dot{1}$	**M1**	
	$100x - x = 31$ and completion to $x = \dfrac{31}{99}$	**A1**	
12(b)	$7\sqrt{5}$	**2**	**B1** for $4\sqrt{5}$ or $3\sqrt{5}$ seen nfww
13(a)	$11x - 2x^2 - 5$ or simplified equivalent	**2**	**M1** for 3 out of 4 terms correct in $10x - 2x^2 - 5 + x$ or for 2 out of 3 terms correct in $11x - 2x^2 - 5$
13(b)	$\dfrac{19 - 16x}{(3x-2)(x+1)}$ or $\dfrac{19 - 16x}{3x^2 + x - 2}$ as final answer	**3**	**B1** for a common denominator of $(3x-2)(x+1)$ oe **B1** for $5(x+1) - 7(3x-2)$ or better

Question	Answer	Marks	Partial Marks
14(a)	rotation 90 ° anti-clockwise centre (2, −1)	**3**	**B1** for each
14(b)	Image at (−1, 3) (−4, 6) (−4, 4)	**3**	**B2** for 2 vertices correct in triangle or 3 correct co-ordinates soi in working or **B1** for 1 vertex in triangle correct soi or **M1** for $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 1 & 4 & 4 \\ 3 & 6 & 4 \end{pmatrix}$ shown or reflection in the *y*-axis stated
15	Correct histogram with vertical scale marked or key given	**4**	**B3** for 4 blocks in correct proportion with no scale marked or key given or **B1** for correct bar widths and **B2** for 3 correct heights and correct scale or key or **B1** for 2 correct heights and correct scale or key or 3 correct frequency densities seen
16	Two correct pairs of angles or one correct pair of angles and one correct pair of lines	**B1**	
	A correct reason linked to a correct statement	**B1**	
	Fully correct argument	**B1**	**dep** all previous marks awarded
17(a)	[*p* =] −4 [*q* =] −3 [*r* =] 5	**3**	**B2** for either [*p* =] −4 or [*q* =] −3 or [*r* =] 5 or **B1** for centre (0, 0) soi or $r^2 = 25$
17(b)	Yes with correct explanation including product of the gradients = −1 therefore perpendicular oe	**3**	**B1** for verifying that (4, 3) lies on the line **B1** for rearranging equation to show gradient given line is $-\dfrac{4}{3}$ **B1** for gradient radius to (4, 3) is $\dfrac{3}{4}$ Maximum 2 marks if no mention of perpendicular oe
18(a)(i)	$y = \dfrac{40}{x}$ oe	**2**	**B1** for $10 = \dfrac{k}{4}$ soi or $y = \dfrac{k}{x}$ oe
18(a)(ii)	64	**2**	**M1** for $\dfrac{5}{8} = \dfrac{their\,40}{x}$ or better

Question	Answer	Marks	Partial Marks
18(b)	8	**2**	**M1** for $r = k\sqrt[3]{V}$ oe or $2r \propto 2\sqrt[3]{V}$ oe or 2^3
19	$\dfrac{7}{10}$ oe	**4**	**B2** for correct completed Venn diagram or **B1** for 3 correctly placed in intersection **B1** for a numerator of 7 or a denominator of 10 soi; **FT** *their* Venn diagram provided the intersection is not empty If Venn diagram not used then **B1** for 10 people [do C or A or both] **B1** for 3 people [do both] **M1** for $\dfrac{6}{10} + \dfrac{1}{10}$ or $1 - \dfrac{3}{10}$ oe
20	$\dfrac{16}{5}\mathbf{b} - \dfrac{4}{5}\mathbf{a}$ oe isw	**4**	**B3** for $\left[\overrightarrow{OD} =\right] 2\mathbf{a} + \dfrac{3}{5}(3\mathbf{b} - 2\mathbf{a})$ soi or for $\left[\overrightarrow{AD} =\right]\dfrac{3}{5}(3\mathbf{b} - 2\mathbf{a})$ **and** $\left[\overrightarrow{AC} =\right]5\mathbf{b} - 2\mathbf{a}$ Or **B2** for $\left[\overrightarrow{AD} =\right]\dfrac{3}{5}(3\mathbf{b} - 2\mathbf{a})$ oe or for $\left[\overrightarrow{AC} =\right]5\mathbf{b} - 2\mathbf{a}$ or **B1** for $\left[\overrightarrow{AB} =\right]3\mathbf{b} - 2\mathbf{a}$ or for $\left[\overrightarrow{OC} =\right]5\mathbf{b}$ or for $\left[\overrightarrow{BC} =\right]2\mathbf{b}$ If 0 scored then **SC1** for a correct vector sum for a correct route
21(a)	Correct cosine curve over full domain	**2**	**B1** for correct cosine shape with correct amplitude **B1** for correct intercepts and over full domain
21(b)	60 and 300	**2**	**B1** for each or **M1** for the line $y = 0.5$ on graph