



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

MATHEMATICS

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Paper 4

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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.

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.

This syllabus is regulated for use in England as a Cambridge International Level 1/Level 2 (9–1) Certificate.

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

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)	$\frac{1}{3}, \frac{1}{5}, \frac{4}{5}, \frac{1}{5}, \frac{4}{5}$ oe	2	B1 for $\frac{1}{3}$ or $\frac{4}{5}$ oe seen in correct place
1(b)	$\frac{8}{15}$ oe	2	M1 for $\frac{2}{3} \times$ <i>their</i> $\frac{4}{5}$
2	$15 - 7r$ final answer	2	B1 for $8r + 12$ or $3 - 15r$ seen or answer $15 + kr$ or $m - 7r$
3	2 with correct working shown	2	B1 for any 2 correct from 40, 10, 30 and 5
4	8	3	M1 for use of area of trapezium formula so i M1dep for correct first step rearranging <i>their</i> equation
5(a)	59.5, 60.5	2	B1 for one correctly placed If 0 scored, SC1 for both correct but reversed
5(b)	31	2	FT <i>their</i> 59.5 M1 for use of 90.5
6	16	2	B1 for $\left[\sqrt[3]{64}\right] = 4$ or $(\textit{their } 4)^2$ or M1 for $(\textit{their } 4)^2$
7	$180 - 150 = 30$	M1	$(n - 2)180 = n \times 150$
	$360 \div 30 = 12$	A1	Correct completion to $n = 12$
8(a)	-4	3	M1 for $7 - x = \frac{55}{5}$ M1 for $-x = \textit{their} (11 - 7)$ or better M1 for correct completion OR M1 for $35 - 5x [= 55]$ M1 for collecting x s and numbers on opposite sides M1 for $x = \frac{a}{b}$ following $bx = a$ ($b \neq 1, a \neq 0$) Incorrect answer scores max 2 marks
8(b)	$\left[r = \right] \frac{L^2}{\pi}$ final answer	2	M1 for $\pi r = L^2$

Question	Answer	Marks	Partial Marks
9(a)		2	B1 for 2 correct values If 0 scored, SC1 for 6 placed correctly and sum of 4 values = 60
9(b)	54	1	FT <i>their</i> (a)
10	10	2	M1 for $6^2 + (-8)^2$ or better
11(a)(i)	$x < 7$	2	M1 for $4x < 40 - 12$ or $x + 3 < 10$ M1 for $x < \frac{b}{a}$ after $ax < b$ seen or $x < \text{their } 10 - \text{their } 3$ Incorrect answer scores maximum 1. If 0 scored SC1 for answer 7 or $x \dots 7$ with any incorrect equality or inequality symbol or answer $4 \times 7 + 12 < 40$
11(a)(ii)		1	FT <i>their</i> inequality in (a)(i)
11(b)	-1, 0, 1, 2, 3	2	B1 for list with one error or omission
12	$125x^{15}$	2	B1 for 125 or x^{15} seen in answer OR M1 for $5x^5$ seen
13	27	3	M1 for $\frac{54}{6}$ M1 for $\sqrt{\text{their} \left(\frac{54}{6} \right)}$
14	$12 + 10\pi$ Final answer	3	M1 for $2 \times \pi \times 5 [+4]$ oe M1 for <i>their</i> $(2 \times \pi \times 5) + 4 \times 3$
15	Angle $ABC = 64$ or reflex angle $AOC = 232$	B1	
	Correct reason associated with angle	B1	
	$m = 128$ with correct reason	B1	Dep on first B1 awarded
16	18 and 32	3	M1 for list of 2-digit square numbers or $2w < 100$ A1 for 18 or 32

Question	Answer	Marks	Partial Marks
17(a)	Correct graph	4	B1 for correct cfs soi B1 for <i>their</i> cfs plotted anywhere in interval B1 for plots at end of interval
17(b)	54 to 56	2	M1 for attempt to read at cf 15 or recognise that 15 do not pass
18	$y = 1 - 2x$ drawn and $[x =] -1.8$ and $[x =] 2.8$	3	M1 for $1 - 2x$ or $2x - 1$ seen or $y = -2x + k$ or $y = kx + 1$ A1 $y = 1 - 2x$ drawn
19(a)	$25x - 18$ final answer	2	M1 for $5(5x - 3) - 3$ or better
19(b)	Convincing argument to show $h(x) = h^{-1}(x)$.	2	M1 for attempt to find $h^{-1}(x)$
20	$(x - 4)^2 - 23$	2	M1 for $(x - 4)$
21	$4(x - 2) + x(x - 3) = 4 \times 3 \times (x - 3)$	M1	
	$4x - 8 + x^2 - 3x = 12x - 36$	M1	
	Fully correct algebra leading to $x^2 - 11x + 28 = 0$.	A1	
22(a)	$\frac{\sqrt{3}}{2}$	1	
22(b)	$\frac{3\sqrt{3}}{8}$ oe	3	FT <i>their</i> (a) for method marks M2 for $[\sin x =] \frac{6}{8} \times \sin 60$ or better or M1 for $\frac{8}{\sin 60} = \frac{6}{\sin x}$ or better
23(a)	$6x^2 + 6x - 12$	2	M1 for one term correct
23(b)	$(-2, 20), (1, -7)$	4	M1 for <i>their</i> $(6x^2 + 6x - 12) = 0$ and M1 for correct attempt to solve a 3 term quadratic A1 for $x = 1$ and -2

Question	Answer	Marks	Partial Marks
24	Total area = $2 + \sqrt{7}$ soi	B1	
	Fraction shaded = $\frac{2}{2 + \sqrt{7}}$	B1	
	= $\frac{2}{2 + \sqrt{7}} \times \frac{2 - \sqrt{7}}{2 - \sqrt{7}}$ oe	M1	For rationalising
	= $\frac{2(2 - \sqrt{7})}{4 - 7}$	M1	For expanding
	= $\frac{4 - 2\sqrt{7}}{-3}$ = $\frac{2\sqrt{7} - 4}{3}$	A1	Answer given. All correct
25	45 and 315	3	B1 for $\cos x = \frac{1}{\sqrt{2}}$ B1 for 45 B1 360 – <i>their</i> 45