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

MATHEMATICS

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Paper 3 (Core)

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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.

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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)(i)	B	1	
1(a)(ii)	D	1	
1(b)	certain	1	
2(a)	B	1	
2(b)	C	1	
2(c)	A	1	
2(d)	E and F	1	
3(a)	Car 23 Motorbike 9	1	
3(b)	Valid explanation	1	
4(a)	-5, -3, -1, 0, 2	1	
4(b)	7	1	FT from <i>their</i> coldest and <i>their</i> warmest, providing one is negative and the other positive
4(c)	-4	1	
5(a)	5.40	2	M1 for 0.45×12 oe or $40\% \text{ [of 12]} = 4.8[0]$ or $5\% \text{ [of 12]} = 0.6[0]$ or $50\% \text{ [of 12]} = 6[.00]$
5(b)	70	2	M1 for $\frac{14}{20}$ or $\frac{7}{10}$ or $0.7[0]$ seen or $10\% \text{ of } 40 = 4$ used in a build-up method soi If 0 scored then SC1 for an answer of $30[\%]$
6(a)	Any correct fraction f where $\frac{3}{5} < f < \frac{4}{5}$	1	
6(b)	Any correct fraction f where $\frac{4}{7} < f < \frac{2}{3}$	2	M1 for a fraction equivalent to $\frac{4}{7}$ or $\frac{2}{3}$ seen
7(a)	1.5 or 1.45 to 1.55	2	M1 for 5.8 to 6.2 seen
7(b)	125 or 123 to 127	1	
8(a)(i)	7	1	
8(a)(ii)	3	2	M1 for $6 - 4.5$ soi or -4.5×2 soi

Question	Answer	Marks	Partial Marks
8(b)	<p> $+ 2$ \rightarrow $\times 4$ or $\times 4$ \rightarrow $+ 8$ </p>	1	
9(a)	63	2	M1 for $[4g - 1 =] 7$ soi or $7 \times k$ or $c \times 9$ or $(4 \times 2 - 1) \times (4 + 5)$
9(b)(i)	Valid explanation	1	
9(b)(ii)	25	1	
10	9600	4	M2 for $\frac{75 \times 60 \times 36}{15 \times 10 \times 9}$ soi or M1 for $75 \times 60 \times 36$ seen or $15 \times 10 \times 9$ seen or M1 for $\frac{75}{15}$ or $\frac{60}{10}$ or $\frac{36}{9}$ soi and M1 for <i>their</i> 120×80
11	2, 2, 9, 11	3	M1 for two 2s or more M1 for four numbers with median 5.5 M1 for four numbers with sum of 24
12(a)	Reflection in x -axis or $y = 0$	2	B1 for each
12(b)	Translation $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ or 3 right and 1 down oe	2	B1 for each
13(a)	$\left[\frac{1}{3} + \frac{1}{6} \right] = \frac{2}{6} + \frac{1}{6}$	M1	Accept correct additions of equivalent fractions with a common denominator
	$= \frac{3}{6} \left[= \frac{1}{2} \right]$	A1	Accept correct result that simplifies to $\frac{1}{2}$
13(b)	$\frac{1}{15}$ cao	2	M1 for $\frac{1}{6} - \frac{1}{10}$ or $\frac{5}{30}$ and $\frac{3}{30}$ oe seen
13(c)(i)	4	1	
13(c)(ii)	$\frac{1}{4} + \frac{1}{12}$ cao	1	

Question	Answer	Marks	Partial Marks
14	225	3	M1 for (number of parts) = $2 \times 4 + 3$ soi M1 for $2475 \div$ <i>their</i> number of parts (<i>their</i> number of parts > 5)
15(a)	$3 \times 7 \times 11$	2	M1 for a correct factor tree or list or for any correct product e.g. 3×77 or 21×11 or 7×33 seen
15(b)	5	2	B1 for a time of 300 seen or M1 for attempting to find the LCM of 75 and 100 oe
16	$9\frac{1}{3}$	3	B2 for $\frac{28}{3}$ or e.g. $9\frac{4}{12}$ seen OR B1 for $\frac{16}{3}$ or $\frac{7}{4}$ oe seen and M1 dep for <i>their</i> $\frac{16 \times 7}{3 \times 4}$ oe attempted and B1FT for converting <i>their</i> improper fraction to a mixed number in its lowest terms Maximum 2 marks if answer incorrect
17	30	2	M1 for $[n =] \frac{360}{12}$ oe
18	66 isw	2	M1 for $\frac{11}{50} \times 300$ If 0 scored then SC1 for an answer of 70
19(a)	1.5 oe	3	M1 for expanding brackets correctly to e.g. $-2x + 6$ M1 for correctly collecting terms on both sides to <i>their</i> $8x =$ <i>their</i> 12 M1 for rearranging to $x = \frac{\textit{their}12}{\textit{their}8}$ where <i>their</i> 8 is not ± 1 and <i>their</i> 12 is not 0 Maximum 2 marks if answer incorrect
19(b)	0, 4	2	B1 for each or M1 for $x(x - 4) [= 0]$ seen
20(a)(i)	1	1	

Question	Answer	Marks	Partial Marks
20(a)(ii)	8	1	
20(a)(ii)	144	2	B1 for 12^2 oe or M1 for 12^{5-3} seen
20(b)	No with valid reason	1	
21	1.17×10^{-4}	2	M1 for 0.000 042 or 0.000 075 seen or 11.7×10^{-5} seen
22	$[2x(3x^2 - 4x)] = 6x^3 - 8x^2$	M1	
	$[8(x^2 + 3)] = 8x^2 + 24$	M1	
	$6x^3 - 8x^2 + 8x^2 + 24 =$ $6x^3 + 24 = 6(x^3 + 4)$	A1	
23	$y = \frac{1}{2}x - 1$ final answer	3	B2 for correct answer in the wrong form or for $y = \frac{1}{2}x + c$, where c may be numerical other than -1 or algebraic or B1 for $y = mx - 1$, where m may be numerical other than $\frac{1}{2}$ or algebraic and M1 for correct grad = $\frac{\text{rise}}{\text{run}}$ calculation seen
24	correct angle bisector	2	M1 for correct bisector with incorrect or no arcs or 2 correct pairs of arcs seen
	correct perpendicular bisector	2	M1 for correct bisector with incorrect or no arcs or 2 correct pairs of arcs seen
	correct region shaded	1	FT <i>their</i> angle bisector and <i>their</i> perpendicular bisector