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CAMBRIDGE
International Education

Cambridge O Level

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2024**

MARK SCHEME

Maximum Mark: 80

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 May/June 2024 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 **8** 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 descriptions 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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Mathematics-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, non-integer 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 or sign 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 A or B 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.

Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

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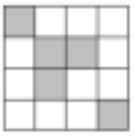
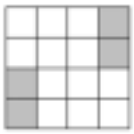
Question	Answer	Marks	Partial Marks
1(a)	–6 –2 0 1 4	**1**	
1(b)	$\frac{3}{8}$ 40[%] 0.45	**1**	
2(a)	Correct small square shaded or 	**1**	
2(b)	Correct small square shaded 	**1**	
3	11 11 12 20 21	**3**	**B2** for list of 5 values with two correct from mode = 11, range = 10, median = 12 or **B1** for list of 5 values with one correct from mode = 11, range = 10, median = 12
4(a)	4000	**1**	
4(b)	0.25 or $\frac{1}{4}$	**1**	
5(a)	34	**1**	
5(b)	5	**2**	**M1** for $\frac{1}{2}(13+y)\times 4=36$ oe
6(a)	33 or 63 or 93	**1**	
6(b)	Correct example showing sum and result e.g. 6 + 9 = 15	**1**	
7(a)	$\frac{6}{7}$ oe	**1**	
7(b)	$1\frac{7}{12}$ or $1\frac{14}{24}$ final answer	**2**	**M1** for correct use of common denominator e.g. $\frac{10}{12}$ and $\frac{9}{12}$ or $\frac{20}{24}$ and $\frac{18}{24}$
8(a)	2 [hours] 44 [minutes]	**1**	

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Question	Answer	Marks	Partial Marks
8(b)	36	**3**	**M2** for $\frac{24}{40 \div 60}$ or better or **M1** for $\frac{24}{40}$ soi or for $\frac{24}{their\,40 \div 60}$
9(a)	$4x+15$ final answer	**2**	**M1** for $2(x+5)$ oe seen
9(b)	3	**2**	**M1** for correct first step in solving $their(4x+15)=27$
10(a)	068 to 072	**1**	
10(b)	Acceptable quadrilateral with intersecting arcs	**2**	**B1** for acceptable D clearly indicated with no/incorrect arcs or for 5 [cm] and 6 [cm] seen
10(c)	Acceptable angle bisector of $\angle B$ with correct arcs	**2**	**B1** for acceptable angle bisector of $\angle B$ with no/incorrect arcs
11	5 **and** 4 **and** 900 seen as rounded values **and** final answer 0.3 or $\frac{3}{10}$	**2**	**B1** for two of 5, 4, 900 seen as rounded values
12(a)	–3	**1**	
12(b)	$\frac{c+9}{4}$ oe final answer	**2**	**M1** for $c+9=4d$ or $\frac{c}{4}=d-\frac{9}{4}$
13(a)	$\frac{9}{20}$ oe	**1**	
13(b)	48	**2**	**M1** for $\frac{4+2}{20}[\times 160]$ oe or $\frac{160}{20}[\times k]$ where k = 1, 2, 4
14(a)	4.2×10^{7} cao	**1**	
14(b)	7.53×10^{-3} cao	**2**	**B1** for answer figs 753 or **M1** for 0.13×10^{-3} or 74×10^{-4} or for 0.00013 **and** 0.0074
15	12.8 or $\frac{64}{5}$ oe	**2**	**M1** for $\frac{8}{BD}=\frac{5}{8}$ oe

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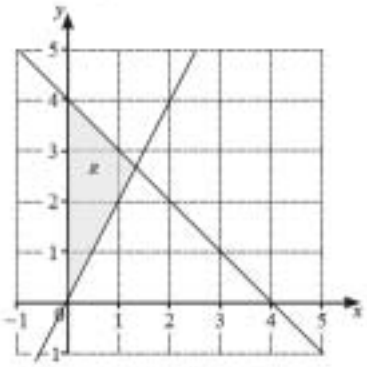
Question	Answer	Marks	Partial Marks
16	Correct region indicated 	3	**B1** for $y = 2x$ ruled **B1** for $x + y = 4$ ruled
17(a)	[x =] 40	2	**B1** for $\angle BCO = 20$ or $\angle BCD = 60$ soi
17(b)	[y =] 70	2	**B1** for $\angle BOC = 140$ or **M1** for answer = *their* 140 ÷ 2
18(a)	$\frac{1}{5}$ or 0.2 final answer	1	
18(b)	$\frac{a^3}{8}$ final answer	2	**B1** for answer $\frac{a^3}{k}$ or $\frac{a^k}{8}$, $k \neq 0$ or **M1** for one of the following seen $\left(\frac{a}{2}\right)^3$ or $\left(\frac{a^6}{64}\right)^{\frac{1}{2}}$ or $\frac{a^3}{8}$ or $\frac{a^{\frac{9}{2}}}{2^3 a^{\frac{3}{2}}}$ or better
19(a)	124.5	1	
19(b)	260 nfww	2	**B1** for 505 **and** 245 seen
20(a)	$\frac{2-5x}{4}$ oe final answer	3	**B2** for $4y = 2 - 5x$ or $-4y = 5x - 2$ or **M1** for $x = \frac{2-4y}{5}$ or better OR **B2** for $x = \frac{2-5y}{4}$ or $x = -\frac{5}{4}\left(y - \frac{2}{5}\right)$ or $x = -\frac{1}{4}(5y - 2)$ or **M1** for correct first step e.g. $5y = 2 - 4x$ or $y - \frac{2}{5} = -\frac{4x}{5}$ or better
20(b)	$\frac{4x}{5}$ final answer	2	**M1** for $\frac{2-4x}{5} - \frac{2-4(2x)}{5}$ oe

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Question	Answer	Marks	Partial Marks
21	Correct histogram	**3**	**B1** for bar $120 < h \leqslant 140$ height 3 **B1** for bar $140 < h \leqslant 150$ height 6.8 **B1** for bar $150 < h \leqslant 160$ height 2.4 If 0 scored, **SC1** for correct frequency densities soi 3, 6.8, 2.4
22(a)	Tangent ruled at $x = 2$	**B1**	
	0.2 to 0.4	**B1**	Dependent on close attempt at tangent at $x = 2$
22(b)	Line $y = 3x - 1$ ruled	**M2**	**M1** for $y = 3x[+k]$ ruled or $y = px - 1$ ruled ($p \neq 0$) or for $[y =]3x - 1$ identified
	–0.6 to –0.4 0.7 to 0.9	**A1**	Dep on M2
23(a)	$\frac{1}{2}\begin{pmatrix} 0 & 1 \\ -2 & 3 \end{pmatrix}$ or $\begin{pmatrix} 0 & \frac{1}{2} \\ -1 & \frac{3}{2} \end{pmatrix}$ oe	**2**	**B1** for $[k]\begin{pmatrix} 0 & 1 \\ -2 & 3 \end{pmatrix}$ oe or for $\frac{1}{2}\begin{pmatrix} . & . \\ . & . \end{pmatrix}$ oe
23(b)	$\begin{pmatrix} 2 \\ -1 \end{pmatrix}$	**2**	**M1** for $\frac{1}{2}\begin{pmatrix} 0 & 1 \\ -2 & 3 \end{pmatrix}\begin{pmatrix} 7 \\ 4 \end{pmatrix}$ or for $\begin{pmatrix} 3x - y \\ 2x \end{pmatrix} = \begin{pmatrix} 7 \\ 4 \end{pmatrix}$ or better or for $3x - y = 7$ **and** $2x = 4$ If 0 scored, **SC1** for 2 and –1 only in final answer

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Question	Answer	Marks	Partial Marks
24	$\frac{1}{2}$ oe nfww	**4**	**B3** for $x^2-3x-5x+5=x^2-x-3x+3$ or better or **M2** for an equation with fractions eliminated or for correct use of common denominator in an equation, accept LHS as two fractions or **M1** for $x(x-3)-5(x-1)$ or common denominator $(x-1)(x-3)$ soi or $\frac{x}{x-1}=\frac{1(x-3)+5}{x-3}$ or $\frac{x-(x-1)}{x-1}=\frac{5}{x-3}$
25	$2\mathbf{a}+\frac{1}{2}\mathbf{b}$ final answer	**3**	**B2** for $\overrightarrow{BX}=2\mathbf{a}-\frac{1}{2}\mathbf{b}$ oe or $\overrightarrow{CX}=-2\mathbf{a}+\frac{1}{2}\mathbf{b}$ oe OR **M1** for a correct vector route for $\overrightarrow{OX}$ along lines of diagram **B1** for $\overrightarrow{OC}=4\mathbf{a}$ soi