Cambridge Assessment International Education

Cambridge O Level

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **October/November 2023**

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 October/November 2023 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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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.

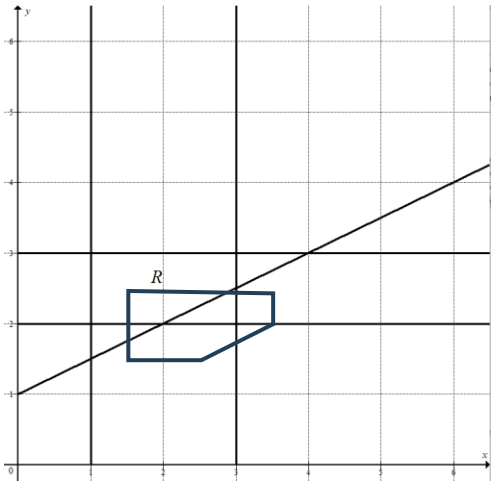
6 Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

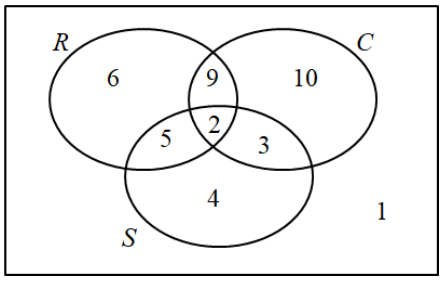
Abbreviations

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)	8	**1**	
1(b)	12	**1**	
2	0.1, $\frac{3}{25}$, 13%, $\frac{1}{5}$	**2**	**B1** for three correct when one is covered up or for correct order reversed
3(a)	8	**1**	
3(b)	14	**1**	
4	7.8[0]	**2**	**B1** for digits 78 or **M1** for their answer converted to dollars or for 12×0.65
5(a)	4	**1**	
5(b)	$\frac{5}{20}$ oe fraction	**1**	
6(a)	70	**1**	
6(b)	110	**1**	
7	50, 3 and 7 seen **and** final answer 5	**2**	**B1** for two of 50, 3, 7 seen
8(a)	7.8	**1**	
8(b)	30 000	**1**	
9(a)	Positive	**1**	
9(b)	Ruled line of best fit	**B1**	
	Reading their straight line of best fit at 50	**B1**	Dependent on positive gradient
10(a)	30	**2**	**M1** for 360 – (150 + 100 + 45 + 35) oe
10(b)	144	**2**	**M1** for $\frac{180\times(10-2)}{[10]}$ oe or for [180 –] $\frac{360}{10}$ oe
11(a)	19	**1**	
11(b)	25	**2**	**B1** for 5^2 leading to final answer or **M1** for $\frac{1}{5}\times5\times5\times5$ oe or better

Question	Answer	Marks	Partial Marks
12(a)	1.76 to 1.84	**2**	**B1** for line measured as 8.8 [cm] to 9.2 [cm] or **M1** for *their* distance in cm written and *their* answer is 0.2 × this value If 0 scored, **SC1** for answers 176 000 to 184 000
12(b)	Acceptable bisector of *AB* with correct arcs	**2**	**B1** for acceptable bisector with no/incorrect arcs
12(c)	*S* marked on a bearing of 105° from *A* and on their bisector	**1**	Dependent on *their* attempt at bisector crossing *AB*
13	$\frac{24}{25}$	**2**	**M1** for $\frac{8}{5}\times\frac{3}{5}$ or $\frac{24}{15}\div\frac{25}{15}$
14(a)	$2 \times 2 \times 3 \times 3$ or $2^2 \times 3^2$	**2**	**B1** for 2, 2, 3, 3 not as product or **M1** for any two stages correct in factor tree or ladder method
14(b)	11 54	**3**	**B2** for 144 or 2 h 24m or **M1** for $2^4 \times 3$ oe or $\frac{36\times48}{12}$ oe OR **M2** for listing times/multiples of both 36 and 48 to at least 11 54 or 144 or **M1** for at least 72, 108 and 96, 144 listed or for at least 10.06, 10.42 and 10.18, 11.06 listed
15(a)	71	**1**	
15(b)	142	**2**	**M1** for angle *ABO* = 90 or angle *ACO* = 90 soi If 0 scored, **SC1** for answer equals 2 × *their* **(a)**
15(c)	71	**1**	**FT** *their* **(b)** ÷ 2
16		**4**	**B1** for $x = 1$ and $x = 3$ correctly drawn **B1** for $y = 2$ and $y = 3$ correctly drawn **B1** for $y=\frac{x}{2}+1$ correctly drawn

Question	Answer	Marks	Partial Marks
17	$\frac{5}{2}$ oe	**2**	**B1** for $k = \frac{1}{2}$ if $y = k\sqrt{x}$ used or **M1** for $2 \times \sqrt{25} = y \times \sqrt{16}$ oe or **M1FT** for $y = \textit{their } k \times \sqrt{25}$
18(a)		**3**	**B2** for Venn diagram with 6 or 7 correct values or **B1** for Venn diagram with 4 or 5 correct values or for answer 2 in intersection
18(b)	$G \cap H \cap F'$ oe	**1**	
19(a)	2	**1**	
19(b)	40	**3**	**M2** for a correct equation in T, e.g. $\frac{20(T + T - 10)}{2} = 700$ or **B2** for length of rectangle = 30 nfww or **M1** for a correct method to find a relevant area under the graph e.g. $\frac{10 \times 20}{2}$ oe
20(a)	$-\frac{1}{10}\begin{pmatrix} 3 & -1 \\ -4 & -2 \end{pmatrix}$ oe	**2**	**B1** for $k\begin{pmatrix} 3 & -1 \\ -4 & -2 \end{pmatrix}$ oe or for $-\frac{1}{10}\begin{pmatrix} . & . \\ . & . \end{pmatrix}$
20(b)	$\begin{pmatrix} -7 & -3 \\ 9 & 11 \end{pmatrix}$	**2**	**B1** for two or three correct elements
21(a)	$3(2a - 3)$ final answer	**1**	
21(b)	$(2b + 5)(2b - 5)$ final answer	**1**	
21(c)	$\frac{2c}{2c+3}$ final answer	**3**	**B1** for $2c(c - 4)$ seen **B1** for $(2c + 3)(c - 4)$ seen
22(a)	1	**1**	
22(b)	$4(x - 3)$ or $4x - 12$ final answer	**2**	**B1** for $x = \frac{y}{4} + 3$ or $y - 3 = \frac{x}{4}$ or $4y = x + 12$ or better in each case

Question	Answer	Marks	Partial Marks
22(c)	$-\frac{20}{7}$ oe	**3**	**B1** for $\frac{p}{4}+3=2(p+5-1)$ oe **M1** for expansion of brackets and isolation of terms in *p*
23(a)	**c** – **a**	**1**	
23(b)	$\frac{1}{2}\mathrm{a}+\frac{1}{2}\mathrm{c}$ oe simplified vector	**2**	**M1** for a correct route along the lines of the diagram or **B1FT** for $\overrightarrow{AX}=\frac{1}{2}(\mathrm{c}-\mathrm{a})$ or $\overrightarrow{CX}=\frac{1}{2}(\mathrm{a}-\mathrm{c})$
23(c)	$-\frac{1}{2}\mathrm{a}-\frac{1}{6}\mathrm{c}$ oe simplified vector	**2**	**M1** for a correct route for $\overrightarrow{YX}$ along the lines of the diagram but can include correct $\overrightarrow{OX}$ or **B1** for $\overrightarrow{AY}=\frac{2}{3}\mathrm{c}$ or $\overrightarrow{BY}=-\frac{1}{3}\mathrm{c}$
24	$\frac{1}{5}$ oe	**4**	**M2** for elimination of fractions or correct use of common denominator in an equation, accept LHS as two fractions or **M1** for $3x(x-1)-2(x+1)$ or denominator $(x+1)(x-1)$ soi or $\frac{3x}{x+1}=\frac{3(x-1)+2}{x-1}$ or $\frac{3x-3(x+1)}{x+1}=\frac{2}{x-1}$ AND **M1** for expansion of all brackets in clearing fractions