Cambridge O Level

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

Paper 1   **October/November 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 October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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).
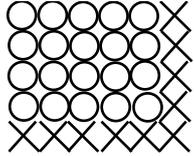

GENERIC MARKING PRINCIPLE 6:

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.
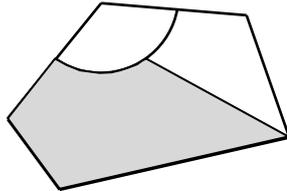

Mathematics-Specific Marking Principles

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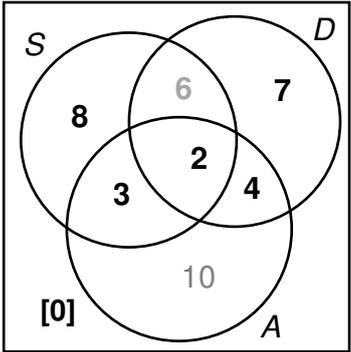
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1	43.079 cao	**1**	
2	19 cao	**1**	
3	0.6, 0.606, $\dfrac{16}{25}$, 66[%], $\dfrac{2}{3}$	**2**	**B1** for four correct when one is covered up or for answer $\dfrac{2}{3}$, 66[%], $\dfrac{16}{25}$, 0.606, 0.6
4(a)	$\dfrac{1}{t^3}$ or t^{-3} final answer	**1**	
4(b)	6 cao	**1**	
5(a)	180 80 40	**2**	**B1** for one angle correct or **M1** for $\dfrac{60}{15}[\times k]$ oe where k = 1, 45, 20 or 10 or for 1 person = 4[°]
5(b)	Correct pie chart	**2**	**FT** *their* table if angles add up to 360° **B1FT** for one sector drawn correctly
6	680	**2**	**M1** for $800 - \dfrac{15}{100} \times 800$ oe or $\dfrac{85}{100} \times 800$ oe or **B1** for 80 + 40 or 120 seen
7	$1\dfrac{7}{12}$ cao	**2**	**M1** for correct use of common denominator e.g. $\dfrac{9}{12}$ and $\dfrac{10}{12}$ oe
8	3 (hrs) 15 (mins)	**2**	**M1** for $\dfrac{13}{4} \times 60$ or $\dfrac{13}{4}$ seen or 3.25 or 195
9(a)		**1**	
9(b)	10 12 20 30	**2**	**B1** for 2 or 3 correct
9(c)	72	**1**	
9(d)	$n(n + 1)$ oe final answer	**2**	**B1** for a quadratic expression in n as answer or for correct answer seen or for at least two second differences of 2 seen for numbers of circles sequence

Question	Answer	Marks	Partial Marks
10(a)	7 to 8	2	**B1** for radius measured as 2.8 to 3.2 [cm] or **M1** for *their* radius written and *their* answer is 2.5× this value
10(b)(i)	Acceptable bisector of angle *AED* with correct arcs meeting boundary of stage	2	**B1** for acceptable bisector with no/incorrect arcs
10(b)(ii)	Correct region shaded 	1	**FT** *their* angle bisector at *E*
10(c)	246	1	
11	$2m(2m - 7)$ final answer	2	**B1** for $2(2m^2 - 7m)$ or $m(4m - 14)$ or for $2m(2m - 7)$ seen not as final answer
12	$\sqrt{5}$ cao	1	
13	4.2×10^7 cao	2	**B1** for answer figs 42 or for answer $A \times 10^7$ with $1 \leqslant A < 10$ or **M1** for 50×10^6 or 0.8×10^7 or both numbers adjusted to the same power of 10 or for 50 000 000 <u>and</u> 8 000 000 seen
14	$2^3 \times 3^2 \times 5 \times 7$ or $2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 7$	1	
15	18	2	**M1** for $\dfrac{180(n-2)}{n} = 160$ oe or $\dfrac{360}{180-160}$ oe
16(a)	Correct shape drawn with coords $(1, -1)$, $(2, -1)$, $(2, -2)$, $(5, -2)$, $(5, -3)$, $(1, -3)$	2	**B1** for translation by $\begin{pmatrix} k \\ -5 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ k \end{pmatrix}$
16(b)	Rotation 90° clockwise oe [Centre] (4, 1)	3	**B1** for each
17(a)	$[0 \leq]\, x \leqslant 4$ $y \leqslant x + 1$ oe	2	**B1** for $[0 \leq]\, x \leqslant 4$ or for $y \leqslant x + 1$ oe If 0 scored, **SC1** for $x = 4$ and $y = x + 1$ soi
17(b)	20	2	**M1** for $\dfrac{1}{2} \times 10 \times 4$ oe

Question	Answer	Marks	Partial Marks
18(a)	95	**2**	**B1** for [UQ =] 300 or [LQ =] 205 seen
18(b)	260	**2**	**B1** for 36 seen or 60 – 24 seen or for 260 seen not as final answer
19	6 [cm] cao	**2**	**M1** for $\sqrt[3]{\dfrac{270}{640}}$ or $\sqrt[3]{\dfrac{640}{270}}$ oe soi or $\left(\dfrac{w}{8}\right)^3 = \dfrac{270}{640}$ oe seen
20(a)	$8a^{15}$ final answer	**2**	**B1** for $8a^k$ or ka^{15} as final answer, $k \neq 0$ or for $8a^{15}$ seen not as final answer
20(b)	$8c^2 + 30cd - 27d^2$ final answer	**2**	**M1** for three terms correct from $8c^2 - 6cd + 36cd - 27d^2$
21	$\begin{pmatrix} 13 & -7 \\ 1 & 1 \end{pmatrix}$	**3**	**B2** for answer $\begin{pmatrix} k & -7 \\ 1 & \dfrac{13}{k} \end{pmatrix}$ or $\begin{pmatrix} \dfrac{13}{m} & -7 \\ 1 & m \end{pmatrix}$ or $\begin{pmatrix} 1 & -7 \\ 1 & 13 \end{pmatrix}$ OR **M1** for $20 = km - 7 \times -1$ oe soi **B1** for [**A** =] $\begin{pmatrix} k & -7 \\ 1 & m \end{pmatrix}$
22(a)	–11	**1**	
22(b)	$\dfrac{2x+1}{3}$ oe final answer	**2**	**B1** for correct first step e.g. $2y = 3x - 1$ or better or for $x = \dfrac{3y-1}{2}$ or better
22(c)	–2	**3**	**B2** for $5^x = \dfrac{1}{25}$ or **B1** for $f\left(\dfrac{9}{25}\right) = \dfrac{1}{25}$ or **M1** for $\dfrac{3\left(\frac{9}{25}\right)-1}{2} = 5^x$ oe or better

Question	Answer	Marks	Partial Marks
23(a)		3	**B1** for Venn diagram with 3 and 7 in correct place **B1** for Venn diagram with 8 and 2 correct or for *their* 8 = 4 × *their* 2 or for 4 in the correct place
23(b)	$A \cap S' \cap D'$ oe	1	
24(a)	(–2, 1)	1	
24(b)	$y = -\dfrac{1}{3}x + \dfrac{11}{3}$ oe	4	**M1** for [gradient PQ =] $\dfrac{-2-4}{-3-(-1)}$ oe **M1** for [gradient perp =] $-\dfrac{1}{their\ \text{gradient } PQ}$ soi **M1** for $4 = (their -\dfrac{1}{3}) \times -1 + c$ oe or for $y - 4 = \left(their -\dfrac{1}{3}\right)(x--1)$ oe
25	Correct complete histogram	3	**B1** for each correct rectangle If 0 scored, **SC1** for correct frequency densities 5, 3.5, 1 soi
26(a)	2**b** – **a** final answer	1	
26(b)	$\left[\overrightarrow{OC} =\right]$ **a** + 4(2**b** – **a**) oe or $\left[\overrightarrow{OC} =\right]$ 2**b** + 3(2**b** – **a**) oe with correct working leading to $\left[\overrightarrow{OC} =\right]$ 8**b** – 3**a**	2	**M1** for $\overrightarrow{AC}$ = 4(2**b** – **a**) or $\overrightarrow{BC}$ = 3(2**b** – **a**) or $\overrightarrow{AC}$ = 4(*their*(2**b** – **a**)) or $\overrightarrow{BC}$ = 3(*their*(2**b** – **a**)) or for a correct route for $\overrightarrow{OC}$ seen e.g. $\left[\overrightarrow{OC} =\right] \overrightarrow{OA} + \overrightarrow{AC}$ oe or $\left[\overrightarrow{OC} =\right] \overrightarrow{OB} + \overrightarrow{BC}$ oe
26(c)	$\dfrac{1}{3}$	1	