Cambridge Assessment International Education

Cambridge O Level

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

Paper 1 **October/November 2022**

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 2022 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.

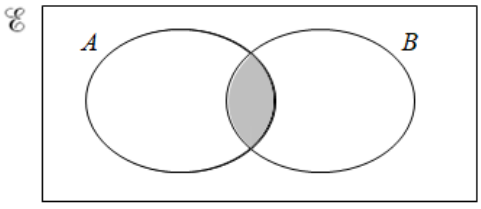
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Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, 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 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 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)	–10	**1**	
1(b)	8	**1**	
2	0.54 cao	**2**	**M1** for 0.45×1.2 oe or for answer figs 54
3	$\frac{4}{5}, \frac{13}{15}, \frac{27}{30}, \frac{11}{12}$ oe	**2**	**B1** for three correct when one is covered up If 0 scored, **SC1** for $\frac{11}{12}, \frac{27}{30}, \frac{13}{15}, \frac{4}{5}$
4(a)	162 to 174	**2**	**B1** for 5.4 to 5.8 or **M1** for *their* distance in cm written and their answer is 30 times this value
4(b)	123 to 127	**1**	
4(c)	*C* in correct position	**2**	**B1** for bearing of 164° from *A* or 252° from *B*
5(a)(i)	306.25 cao	**1**	
5(a)(ii)	310 cao	**1**	
5(b)	9 and 1000 seen **and** final answer 71	**2**	**B1** for 9 and 1000 seen
6(a)	4^5 cao	**1**	
6(b)	5	**1**	
6(c)	$16x^{12}$ final answer	**1**	
7(a)	$\frac{1}{8}$ oe	**1**	
7(b)	$2\frac{4}{5}$ cao	**2**	**M1** for $\frac{8}{5} \times \frac{7}{4}$ oe or better
8	$3a(a + 4)$ final answer	**2**	**B1** for $3(a^2 + 4a)$ or $a(3a + 12)$ or for $3a(a + 4)$ seen not as final answer
9(a)		**1**	
9(b)(i)	5	**1**	

Question	Answer	Marks	Partial Marks
9(b)(ii)	15	**1**	
10(a)	3.2×10^{8}	**1**	
10(b)	5×10^{-13}	**2**	**B1** for 0.5×10^{-12} oe or $5 \times 10^{-1} \times 10^{-12}$ seen or for answer $A\times10^{-13}$ with $1 \leqslant A \leqslant 10$
11(a)	$2\times2\times2\times3\times5$ or $2^3\times3\times5$	**2**	**B1** for full list of prime factors, not as product or **M1** for any two stages correct in factor tree or ladder method
11(b)	35	**1**	
12(a)	$-2x - 3$ or $-(2x + 3)$ final answer	**2**	**M1** for $6x + 3 - 8x - 6$ or for answer $-2x + k$ or $kx - 3$
12(b)	$x^2 + 2x - 15$ final answer	**2**	**B1** for 3 terms out of $x^2 + 5x - 3x - 15$ soi
13(a)	2, 11, 26	**2**	**B1** for any two correct If 0 scored, **SC1** for answer –1, 2, 11
13(b)	3^{n-1} oe final answer	**2**	**B1** for answer 3^k where k is f(n) or for correct answer seen and spoilt
14(a)	$2x$	**1**	
14(b)	$90 - 2x$ or $2(45 - x)$ final answer	**2**	**B1** for $\angle OBA = 90$ soi or for answer correct but not in simplified form
14(c)	$90 - x$ final answer	**2**	**B1** for $\angle BCD = 90$ soi or $\angle CBA = x$ soi or **M1** for $\frac{180 - their(a)}{2}$ or $180 - (90 + x)$
15(a)	28	**2**	**M1** for $\frac{AC}{7} = \frac{12}{3}$ oe
15(b)	10 cao	**2**	**B1** for $\left(\frac{12}{3}\right)^2$ or $\left(\frac{3}{12}\right)^2$ soi or **M1** for ½ × 7 × $\frac{h}{4}$, where h = $\frac{160}{\frac{1}{2}\times their(a)}$ oe
16(a)	2	**1**	

Question	Answer	Marks	Partial Marks
16(b)	$x \geqslant 1$ oe $y \leqslant 5$ oe $y \geqslant 2x + 1$ oe	**3**	**B1** for $x \geqslant 1$ oe **B1** for $y \leqslant 5$ oe **B1FT** for $y \geqslant$ (*their* 2)$x + 1$ If 0 scored, **SC1** for 3 correct equations soi
17(a)	$\frac{20}{120}$ oe	**1**	
17(b)	16	**3**	**B2** for total distance = 9600 OR **M1** for total distance = $\frac{(360+600)}{2} \times 20$ or $\frac{1}{2} \times 20 \times 120 + 20 \times 360 + \frac{1}{2} \times 20 \times 120$ oe **M1** for average speed = $\frac{\textit{their}9600}{600}$
18	50	**2**	**B1** for $k = 2$ if $b = ka^2$ used or **M1** for $\frac{18}{3^2} = \frac{b}{5^2}$ oe or **M1** for $b = \textit{their}\, k \times 5^2$
19	$AC = AC$ common [side] $AD = AB$ equilateral [triangle] $\angle ACD = \angle ACB = 90°$ [Congruent] RHS	**3**	**B2** for two pairs of equal sides/angles with correct reasons or **B1** for one pair of equal sides/angles with correct reason or for two appropriate pairs with no or incorrect reasons
20(a)	30	**1**	
20(b)	Rectangle: base 20 to 30, height 4 **and** Rectangle: base 30 to 50, height 1	**2**	**B1** for one correct rectangle
21(a)	$\begin{pmatrix} -1 & 2 \\ 7 & 5 \end{pmatrix}$	**2**	**B1** for two or three correct elements in final answer or for $\begin{pmatrix} -2 & 4 \\ 14 & 10 \end{pmatrix}$ seen
21(b)	$\frac{1}{10}\begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix}$ oe or for $\frac{1}{10}\begin{pmatrix} . & . \\ . & . \end{pmatrix}$
22(a)	[a =] –3 [b =] –16	**2**	**B1** for one correct or for $(x - 3)^2$ soi or for $2a = -6$

Question	Answer	Marks	Partial Marks
22(b)	$x-3=\pm\sqrt{16}$ or $x - 3 = \pm 4$ soi	**M1**	**FT** *their* completed square expression
	7 –1 final answer	**B1**	
23(a)	$4\pi R^2 = \frac{5\pi y^2}{4} + \pi y^2$ oe	**M2**	**M1** for $l = \frac{5y}{4}$ oe soi
	Completion to $y = \frac{4R}{3}$ with no errors	**A1**	
23(b)	$\frac{16\pi R^3}{27}$ final answer	**4**	**B2** for vertical height = $\frac{3y}{4}$ or R or **M1** for $h^2 + y^2 = \left(\frac{5y}{4}\right)^2$ oe or $h^2 + \left(\frac{4R}{3}\right)^2 = \left(\frac{5}{4} \times \frac{4R}{3}\right)^2$ oe **M1** for $\frac{1}{3}\pi y^2\left(\frac{3y}{4}\right)$ or $\frac{1}{3}\pi\left(\frac{4R}{3}\right)^2 R$ with *their* vertical height