Cambridge Assessment International Education

Cambridge O Level

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

Paper 1 **May/June 2020**

MARK SCHEME

Maximum Mark: 80

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & 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, 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.

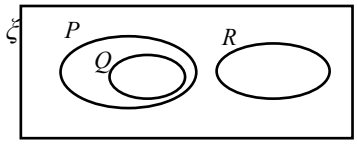
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Abbreviations

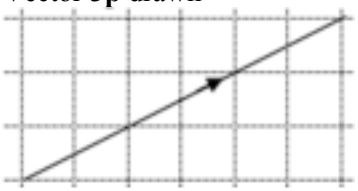
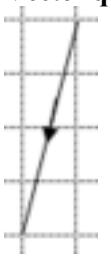
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)	[0].015 oe	**1**	
1(b)	$2\frac{7}{15}$ or $\frac{37}{15}$ oe	**2**	**M1** for correct use of common denominator, e.g. $\frac{40}{15}-\frac{3}{15}$ or $\frac{10}{15}-\frac{3}{15}$
2(a)	3	**1**	
2(b)	Kite	**1**	
3	$\sqrt[3]{125}$ $\sqrt{196}$ 4^3 9^2	**2**	**B1** for three correct when one is covered up or for two or three correctly evaluated
4(a)	$\frac{17}{25}$ cao	**1**	
4(b)	$\frac{3}{8}$ oe fraction	**1**	
5	3, 60 and 0.9 seen and final answer $\frac{1}{2}$ or 0.5	**2**	**B1** for two of 3, 60 and 0.9 seen
6(a)	0 to 5	**1**	
6(b)	40	**2**	**M1** for $[8\times]\frac{360}{72}$ or $\frac{72}{8}$
7	$(5+2y)(3a-x)$ final answer	**2**	**B1** for one correct partial factorisation seen
8(a)	Negative	**1**	
8(b)	Ruled line of best fit	**1**	
8(c)	136 to 140	**1**	**FT** *their* straight line of best fit

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Question	Answer	Marks	Partial Marks
9(a)	85	**1**	
9(b)	*C* positioned correctly	**2**	**B1** for *C* on bearing of 140° from *A* or 235° from *B*
10(a)	2 hours 13 minutes	**1**	
10(b)	12 49	**3**	**M1** for $12 \div 5$ soi **M1** for conversion of *their* time to hours and minutes
11(a)	5.5 oe	**1**	
11(b)	$1\frac{1}{25}$ oe	**1**	
12(a)(i)	Arc, centre *B* radius 5 cm	**1**	
12(a)(ii)	Acceptable bisector of *AC* with correct arcs	**2**	**B1** for acceptable bisector with no/incorrect arcs
12(b)	Correct region shaded	**1**	**FT** *their* arc centre *B* and *their* perpendicular bisector
13(a)	$2 \times 2 \times 3 \times 3 \times 3$ or $2^2 \times 3^3$	**2**	**B1** for 2, 2, 3, 3, 3 as factors or **M1** for any two stages correct in factor tree or ladder method
13(b)	540	**2**	**B1** for $2^2 \times 3^3 \times 5$ oe or **M1** for 2, 2, 3, 3, 5 identified as prime factors of 180 or for at least three multiples of 180 and 108 listed
14(a)	9.75×10^7	**1**	
14(b)	130 or 131 or 150 nfww	**2**	**M1** for $2.6[2] \times 10^8 \div 2 \times 10^6$ or for $3 \times 10^8 \div 2 \times 10^6$
15	$x \leqslant 5$ $y \geqslant 3$ $y \leqslant x + 1$ oe	**3**	**B1** for each inequality If 0 scored, **SC1** for three correct equations soi
16		**2**	**B1** for *Q* or *R* correct

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Question	Answer	Marks	Partial Marks
17(a)	48	**1**	
17(b)	$n^2 + 5n - 2$ oe final answer	**3**	**B2** for answer $n^2 + 5n + k$ oe or for $5n - 2$ oe seen or **B1** for answer $n^2 + an + b$ or for $5n + k$ oe seen
18(a)	12	**2**	**M1** for $0.2 = \frac{v}{(200-140)}$ oe
18(b)	40	**3**	**M2** for $\frac{1}{2} \times (200 + 140 - T) \times their 12 = 1800$ oe or **M1** for correct partial area e.g. $\frac{1}{2} \times T \times their 12$ or $(140 - T) \times their 12$ or $\frac{1}{2} \times (200 - 140) \times their 12$
19(a)	Vector 3**p** drawn 	**1**	
19(b)	Vector **q** – **p** drawn 	**1**	If 0 scored in (a) and (b), award **SC1** for two correct lines with no/incorrect arrows
20	7.5	**3**	**B1** for 50^2 soi **M1** for *their* area ÷ 100^2
21	$\frac{x^9}{8}$ final answer	**2**	**B1** for final answer $\frac{x^9}{k}$ or $\frac{x^k}{8}$ or for $\left(\frac{x^3}{2}\right)^3$ seen or $\left(\frac{8}{x^9}\right)^{-1}$ seen
22(a)	$\frac{12-x}{4}$ or $3 - \frac{x}{4}$ final answer	**2**	**M1** for $x = 4(3 - y)$ or $\frac{y}{4} = 3 - x$ or $4x = 12 - y$

Question	Answer	Marks	Partial Marks
22(b)	$x = \frac{10}{9}$ oe	**3**	**M1** for $15x - 10 = 6x$ or $5(3x - 2) = 6x$ **M1** for $9x = 10$ or $ax = b$ FT *their* first step
23	$\frac{23 - x}{(2x - 1)(x + 4)}$ or $\frac{23 - x}{2x^2 + 7x - 4}$ final answer	**3**	**B1** for $5(x + 4) - 3(2x - 1)$ oe isw **B1** for denominator $(2x - 1)(x + 4)$ oe isw
24(a)	–8	**2**	**M1** for $3 \times 7 + 2h = 5$ oe
24(b)	$y = \frac{3}{2}x + 19$ oe	**4**	**B1** for gradient of original line $-\frac{2}{3}$ soi **M1** for $-\frac{1}{\textit{their}\ \text{gradient}}$ **M1** for substituting (*their* –8, 7) in $y = \textit{their}\left(\frac{3}{2}\right)x + c$
25(a)	$\begin{pmatrix} 9 & -4 \\ -6 & -5 \end{pmatrix}$	**2**	**B1** for two or three correct elements
25(b)	–2	**1**	
25(c)	$-\frac{1}{2}\begin{pmatrix} -1 & 0 \\ 3 & 2 \end{pmatrix}$ oe	**1**	**FT** $\frac{1}{\textit{their} - 2}\begin{pmatrix} -1 & 0 \\ 3 & 2 \end{pmatrix}$
25(d)	$\begin{pmatrix} 5 & 2 \end{pmatrix}$	**2**	**B1** for one correct element in 1 by 2 matrix or **M1** for $\mathbf{X} = \begin{pmatrix} 4 & -2 \end{pmatrix}\mathbf{A}^{-1}$ oe or for $\begin{pmatrix} 2x - 3y & -y \end{pmatrix} = \begin{pmatrix} 4 & -2 \end{pmatrix}$ oe If 0 scored, **SC1** for answer $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

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