Cambridge Assessment International Education

Cambridge O Level

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

Paper 1 **October/November 2020**

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.

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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.

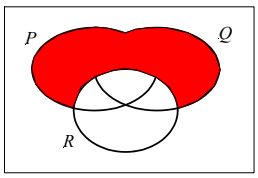
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Abbreviations

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)	$\frac{5}{21}$	**1**	
1(b)	1.64 oe	**1**	
2(a)	$(2p - 1)(2p + 1)$ final answer	**1**	
2(b)	$(5x - 4)(2y + 3)$ final answer	**2**	**B1** for one of the partial factorisations: $2y(5x - 4)$, $3(5x - 4)$, $5x(2y + 3)$, $[-]4(2y + 3)$
3(a)	3	**2**	**B1** for $5x + 2x = 9 + 12$ oe
3(b)	$5y + 7$ final answer	**2**	**M1** for final answer $7 + ky$ or for $k + 5y$ for any $k \neq 0$ or for $16 + 2y - 9 + 3y$ seen
4(a)	3500 cao	**1**	
4(b)	400	**1**	
4(c)	$\frac{2}{3}$	**1**	
5	$13\frac{1}{2}$ oe	**2**	**B1** for 'k' = $\frac{1}{2}$ oe if y = 'k'x^3 used or **M1** for $\frac{y}{3^3} = \frac{4}{2^3}$ oe or **M1** for y = (*their k*) $\times 3^3$ when y = 'k'x^3 used
6(a)	15 years 9 months	**1**	
6(b)	$\frac{8}{23}$	**2**	**B1** for 138 or 0.8 and 2.3 or 2880 and 8280 or for correct equivalent fraction with consistent units
7(a)	3 8 7	**1**	
7(b)	$\frac{11}{20}$ oe	**1**	

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Question	Answer	Marks	Partial Marks
8	6000 **and** 0.04 **and** (√9 or 3) seen, **and** final answer 80	**2**	**B1** for two of 6000, 0.04, (√9 or 3) seen
9(a)	4.3×10^2 cao	**1**	
9(b)	6×10^9 cao	**2**	**B1** for 0.6×10^{10}; or for 6 000 000 000 seen or for final answer $A \times 10^9$ with $1 \leqslant A < 10$
10(a)(i)	0	**1**	
10(a)(ii)	1	**1**	
10(b)	63	**2**	**M1** for $2 \times 75 + 8 \times 60$
11(a)	57	**1**	
11(b)	83	**1**	
12	A **and** C **and** E, with no extras	**2**	**B1** for two or three correct, with not more than one extra
13(a)	66	**2**	**M1** for $\frac{360-2\times70}{10}$ [× 3 or × 7] soi
13(b)	290	**1**	
13(c)	250	**1**	
14(a)		**1**	
14(b)(i)	8	**1**	
14(b)(ii)	12	**1**	
15(a)	Acceptable ruled bisector of angle ABC, with correct construction arcs	**2**	**B1** for an acceptable bisector of angle ABC with no/incorrect construction arcs.
15(b)	Acceptable ruled line parallel to AC.	**1**	
16(a)	$x > 0$ **and** $x < 4$ **and** $y > x$, oe	**2**	**B1** for two of $x > 0$, $x < 4$, $y > x$, oe If 0 scored, **SC1** for the equations of three boundary lines, soi
16(b)	8	**1**	
17(a)	28	**1**	

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Question	Answer	Marks	Partial Marks
17(b)	56	**2**	**B1** for $T\hat{B}C = 62°$ soi, or for $B\hat{O}C = 124°$ If 0 scored, **SC1** for final answer = 2 × *their* **(a)**
18(a)	11 11 11 11 11 11	**1**	
18(b)	$2n + 1$ oe final answer	**1**	
18(c)	$n + 1$ oe final answer	**1**	
18(d)	$(2n + 1)(n + 1)$; or $2n^2 + 3n + 1$ oe	**1**	**FT** *their* **(b)** × *their* **(c)** provided both answers are in terms of n
19	Histogram with correct frequency densities 1.6, 3, 2, 0.6 and correct rectangle bases 10 to 20, 20 to 25, 25 to 30, 30 to 50	**3**	**B1** for 3 or 4 correct frequency densities, soi **B1** for 3 or 4 rectangles on correct bases
20(a)	[Centre] (4, 2) **and** [scale factor] 3	**2**	**B1** for either
20(b)	Triangle C with vertices at (–2, –1), (–3, –1), (–3, –3).	**2**	**B1** for two correct vertices or **B1** for a triangle with the correct size and orientation, but in the wrong position or **SC1** for a correct reflection in $y = x$
21	$y = 2x - 7$ oe final answer	**3**	**B1** for gradient = 2 **M1** for attempt to find c e.g. by substitution of (8, 9) into $y =$ (*their* 2)$x + c$
22(a)	$\begin{pmatrix} 4 & -4 \\ 6 & -17 \end{pmatrix}$	**2**	**B1** for two or three correct elements in a 2 by 2 matrix
22(b)	$\begin{pmatrix} 0 & 2 \\ 2 & -3 \end{pmatrix}$	**1**	
23(a)	$\frac{1}{3}$	**1**	
23(b)	70	**1**	
23(c)	14	**3**	**B2** for total distance = 1400 **OR** **M1** for total distance = ½ × 20 × (40 + 100) oe **M1** for Average speed = $\frac{\textit{their}(\text{distance})}{100}$
24(a)	$3^2 \times 11$ or $3 \times 3 \times 11$	**1**	

Question	Answer	Marks	Partial Marks
24(b)(i)	$2^2 \times 3 \times 5^2$	**2**	**B1** for [p =] [$2^n \times 3^n$] $\times 2^2 \times 5$ or for [q =] [$2^n \times 3^n$] $\times 3 \times 5^2$ or for answer 300 or **M1** for [LCM =] $2^{n+2} \times 3^{n+1} \times 5^2$
24(b)(ii)	$2^n \times 3^n \times 5 \times 19$ oe	**2**	**B1** for $2^n \times 3^n \times$ ... as the only powers of 2 and 3 in a product
25(a)	$A\hat{C}B = A\hat{P}Q$ [given] $B\hat{A}C = Q\hat{A}P$ same angle $A\hat{B}C = A\hat{Q}P$ [third] angles in a triangle Hence similar	**2**	**B1** for two correct pairs of angles identified
25(b)	9 nfww	**2**	**B1** for $\frac{AP}{3} = \frac{12}{4}$ oe
25(c)	$8x$	**1**	