Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

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

Paper 1 **October/November 2018**

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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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)	$\frac{17}{35}$	**1**	
1(b)	$\frac{12}{25}$	**1**	
2(a)	$\frac{7}{40}$ cao	**1**	
2(b)	8.4	**1**	
3	4.5 oe nfww	**2**	**B1** for 'k' = $\frac{1}{2}$ oe if y = 'k' × x^2 used or **M1** for $\frac{8}{4^2} = \frac{y}{3^2}$ oe or **FT M1** for y = (*their k*) × 3^2 when y = 'k' × x^2 used
4	20	**2**	**M1** for $\frac{30-25}{25}$ [× 100]
5(a)	$3a\ (5 + b)$	**1**	
5(b)	$(x + 3)(2k - y)$	**2**	**B1** for one of the partial factorisations: $3(2k - y)$; $x(2k - y)$; $2k(x + 3)$; [–]$y(x + 3)$; $y(-x - 3)$
6(a)	–1.5 oe	**1**	
6(b)	$\frac{3-4x}{x}$ oe final answer	**2**	**B1** for $y(x + 4) = 3$; or $x = \frac{3}{y+4}$; or better
7(a)	9	**1**	
7(b)	$4n + 5$ cao	**2**	**B1** for $4n + k$ oe

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Question	Answer	Marks	Partial Marks
8(a)	Any correct number	**1**	
8(b)	4	**1**	
9(a)	110°	**1**	
9(b)	50°	**1**	
9(c)	120°	**1**	
9(d)	60°	**1**	
10	Correct net	**2**	**B1** for one or two correctly placed rectangles.
11(a)	1.6×10^{11}	**2**	**B1** for 16×10^{10} oe
11(b)	2.5×10^{-6}	**2**	**B1** for Answer figs. 25; or for $A \times 10^{-6}$ with $1 \leqslant A < 10$; or for $\frac{1}{4} \times 10^{-5}$ seen in Answer or Working.
12	600 **and** 0.03 **and** 20 seen **and** final answer 0.9; or $\frac{9}{10}$	**2**	**B1** for two of 600, 0.03, 20 seen.
13	Correct histogram with Freq. densities 1, 1.5, 2, 2.4, 0.8	**3**	**B1** for 4 or more rectangles on correct bases. **B1** for 4 or more correct Freq. densities, soi.
14(a)	$\frac{8}{9}$ cao	**1**	
14(b)	$\frac{x^2}{3}$ cao	**2**	**B1** for x^2; or for x^{-2}; or for 3; in numerator or denominator; or for $\left(\frac{x^6}{27}\right)$ seen.
15(a)	$\frac{50}{200}$ oe	**1**	
15(b)	5	**1**	**FT** 20 × *their* **(a)** provided *their* **(a)** < 1.
15(c)	No, with a supporting reason	**1**	e.g.: [has been spun enough times for results to be reliable.]; results are significantly different from those for a fair spinner.

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Question	Answer	Marks	Partial Marks
16(a)	6 nfww	**2**	**M1** for (2 × (6 + 9)) / (time in hours)
16(b)(i)	130°	**1**	
16(b)(ii)	220°	**1**	
17(a)	$2^4 \times 3 \times 5^2$ oe	**1**	
17(b)	30	**1**	
18	125 nfww	**3**	**B1** for angle sum = (6 – 2) × 180°; or 720° **M1** for $\frac{\textit{their}(720) - (100+110+120+140)}{2}$ **OR** **M1** for 360 – *X*, where *X* is 2*y* + (180 – 100) + (180 – 110) + (180 – 120) + (180 – 140) and *y* is the unknown exterior angle **B1** for [exterior angle =] 55 seen
19(a)	96° to 98°	**1**	
19(b)(i)	Acceptable bisector of angle *ABC* with correct arcs	**2**	**B1** for an acceptable angle *ABC* bisector with no/incorrect arcs. or **SC1** for a very short line correctly constructed.
19(b)(ii)	Acceptable perpendicular bisector of *AB* with two pairs of correct arcs	**2**	**B1** for an acceptable perpendicular bisector of *AB* with no/incorrect/only one pair of arcs or **B1** for two pairs of correct arcs, without a line joining the points of intersection or **SC1** for a very short line correctly constructed.
20(a)	$\begin{pmatrix} 0 & -5 \\ -6 & 4 \end{pmatrix}$	**2**	**B1** for two or three correct elements.
20(b)	$\frac{1}{2}\begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix}$ oe; or $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ 0 & 1 \end{pmatrix}$ oe	**2**	**B1** for $k\begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix}$ oe with $k \neq \frac{1}{2}$; or for $\frac{1}{2}\begin{pmatrix} . & . \\ . & . \end{pmatrix}$ oe

Question	Answer	Marks	Partial Marks
21(a)	$x > 2$ oe **and** $6x + 7y < 42$ oe	**2**	**B1** for one correct or for x ... 2 oe **and** $6x + 7y$ ... 42 oe, with incorrect (in)equalities for ... .
21(b)	Both 1 **and** 2, only, nfww	**2**	**B1** for C is (2, 4. ...) oe; or for gradient of $OC = 2$. ... oe
22(a)	Reflection **and** $y = -x$ oe	**2**	**B1** for either
22(b)	Triangle with vertices (1,0), (3,0), (3,1)	**2**	**B1** for 90° clockwise rotation with wrong centre, or for the triangle with vertices (–1,0), (–3,0), (–3,–1)
22(c)	$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$	**1**	
23(a)	6**q** oe	**1**	
23(b)	6**p** + 6**q** isw	**1**	**FT** 6**p** + *their* **(a)** isw
23(c)(i)	9**p** + 9**q** oe	**1**	
23(c)(ii)	2 : 3 oe	**1**	
24(a)	2.4 oe final answer	**1**	
24(b)	32	**1**	
24(c)	16 nfww	**3**	**M2** for $\frac{1}{2} \times (44 + 20) \times 10$ oe = 20k oe or **M1** for $\frac{1}{2} \times (44 + 20) \times 10$ oe, or for 20k oe = *their* distance travelled from $t = 0$ to $t = 10$
25(a)	4.5 oe	**2**	**M1** for $\frac{PQ}{12} = \frac{3}{8}$ oe; or for [PQ =] $12 \times \frac{3}{8}$
25(b)	$\frac{55}{64}x$ oe	**2**	**B1** for $\left(\frac{3}{8}\right)^2$ or for $\left(\frac{8}{3}\right)^2$ seen or **M1** for [area of $BCQP$ =] x – area of ΔAPQ provided area of ΔAPQ is in terms of x.

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