Cambridge O Level

**Cambridge Assessment International Education**
Cambridge Ordinary Level

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

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.

Cambridge International is publishing the mark schemes for the October/November 2018 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.

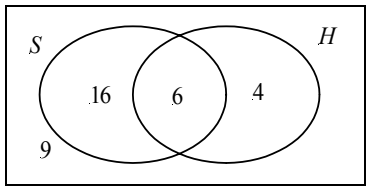
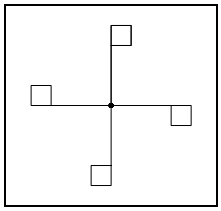
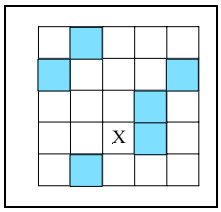
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**Abbreviations**

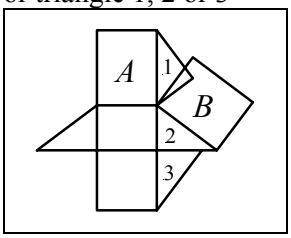
| | |
|---|---|
| cao | correct answer only |
| dep | dependent |
| FT | follow through after error |
| isw | ignore subsequent working |
| oe | or equivalent |
| SC | Special Case |
| nfww | not from wrong working |
| soi | seen or implied |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 1(a) | $\frac{21}{40}$ | **1** | |
| 1(b) | 0.0044 | **1** | |
| 2(a) | 4.25 | **1** | |
| 2(b) | 40 | **1** | |
| 3 | 2 nfww | **2** | **B1** for '$k$' = 10 oe if $y$ = '$k$' / $x$ used<br>or **M1** for $30 \times \frac{1}{3} = 5y$ oe<br>or **FT M1** for $y$ = (*their k*) / 5 when $y$ = '$k$'/ $x$ used |
| 4 | $\frac{4}{5}$ $\frac{41}{50}$ $\frac{21}{25}$ $\frac{17}{20}$ $\frac{9}{10}$ | **2** | **B1** for four correct when one is covered up |
| 5(a) | $15 - 2c$ | **1** | |
| 5(b) | $(2 + 3x)(4 - 5y)$ final answer | **2** | **B1** for one of the partial factorisations:<br>$2(4 - 5y)$; $3x(4 - 5y)$; $4(2 + 3x)$;<br>$[-]5y(2 + 3x)$<br>$5y(-2 - 3x)$ |
| 6(a) | $-\frac{1}{6}$ oe | **1** | |
| 6(b) | $\frac{5}{3x - 2}$ oe final answer | **3** | **B2** for $3yx - 2y = 5$; or for $x(3y - 2) = 5$<br>or **B1** for $3xy = 2x + 5$; or for $x = \frac{2y + 5}{3y}$;<br>or for $3xy - 2x = 5$; or for $3xy = 2y + 5$ |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 7 | 9 | **2** | **B1** for a Venn diagram with at least two of 16, 6, 4, 9 in the correct subset.<br><br>or **M1** for 35 – (22 + 10 – 6) oe |
| 8(a) |  | **1** | |
| 8(b) |  | **1** | |
| 9(a) | $1.6 \times 10^{6}$ | **1** | |
| 9(b) | $4 \times 10^{-17}$ | **1** | |
| 9(c) | $2 \times 10^{-2}$ | **1** | |
| 10 | 1200 **and** 300 **and** 25 seen;<br>**and** final answer 0.8 or $\frac{4}{5}$ | **2** | **B1** for two of 1200, 300, 25 seen |
| 11(a) | $\frac{23}{24}$ $\frac{27}{28}$ | **1** | |
| 11(b) | 300 | **1** | |
| 11(c) | $\frac{4n-1}{4n}$ oe | **2** | **B1** for $\frac{\ldots}{4n}$, or for $4n - 1$ oe |
| 12 | 72 nfww | **2** | **M1** for $\frac{360}{180-175}$; or for<br>$(n - 2) \times 180 = 175n$ oe |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 13(a) | 50 000 | **1** | |
| 13(b) | 286° to 289° | **1** | |
| 13(c) | Acceptable triangle *ABC* with intersecting arcs at a labelled point C | **2** | **B1** for an acceptable triangle with the correct point *C* clearly labelled, but with no/incorrect arcs;<br>or **B1** for an acceptable drawn triangle with intersecting arcs but no label *C*;<br>or **B1** for an acceptable point *C* clearly labelled, with intersecting arcs, but with *AC* and/or *BC* not drawn. |
| 14(a) | Correct net | **2** | **B1** for rectangle A<br>or triangle 1, 2 or 3<br> |
| 14(b) | 60 nfww | **2** | **M1** for attempting to find the areas of five faces<br>or **B1** for four of 6, 6, 12, 16, 20 (or combinations) |
| 15(a) | 5 correct plots | **2** | **B1** for 3 or 4 correct plots |
| 15(b) | Negative | **1** | |
| 15(c) | Line of best fit | **1** | Acceptable **ruled** straight line. |
| 15(d) | Reading their value for $x = 7.6$ | **1** | Strict **FT**. |
| 16 | 10 **and** 11 **and** 12 | **3** | **B2** for 2 correct and no extras; or for 3 correct and one extra<br>**OR**<br>**B1** for $x < 12\frac{1}{2}$<br>and **B1** for $x > 9$ oe<br>**OR**<br>**SC1** for both $x = 9$ **and** $x = 12\frac{1}{2}$<br>or for both $9 > x$ **and** $x > 12\frac{1}{2}$ |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 17(a) | $\frac{4}{7}$ | **1** | |
| | $\frac{2}{7}$ (black) **and** $\frac{5}{7}$ (white) with two branches and both labels | **1** | |
| 17(b) | $\frac{13}{35}$ oe | **2** | **FT** $\frac{3}{5}\times\frac{3}{7}+\frac{2}{5}\times(their\frac{2}{7})$<br>or **M1** for $\frac{3}{5}\times\frac{3}{7}$ ; or for $\frac{2}{5}\times(their\frac{2}{7})$ |
| 18(a) | 53 | **1** | |
| 18(b) | 40 | **1** | |
| 18(c) | 22 | **1** | |
| 19(a) | All four angle bisectors | **2** | **B1** for one, two or three angle bisectors |
| 19(b) | Acceptable perpendicular bisector of $OQ$ | **1** | |
| 20(a) | $(1,\ 2\frac{1}{2})$ | **1** | |
| 20(b) | $-\frac{3}{8}$ oe | **1** | |
| 20(c) | $P$, with supporting evidence, nfww<br>e.g. $OP = 5$, $OR = 6$ | **2** | **B1** for $OR = 6$ nfww<br>or **M1** for $\sqrt{(-3)^2+4^2}$ , or better |
| 21(a) | 10 | **1** | |
| 21(b) | –1 nfww | **2** | **B1** for $[4^n =]\ 2^{2n}$ , or $(2^2)^n$; or for $2n = n - 1$ |
| 22(a) | 0, 2 | **1** | |
| 22(b) | 6 | **1** | |
| 22(c) | 0, 2, 4, 6 | **2** | **B1** for 0, 2, 4, 6 plus extras (e.g. repeated 2 or 4; or an 8)<br>or **B1** for three of 0, 2, 4, 6 with no extras.<br>or **M1** for $2x + y$ clearly seen correctly evaluated for two or more valid values of $x$ and $y$ |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 23(a) | $\begin{pmatrix} 5 \\ -9 \end{pmatrix}$ | **2** | **B1** for one correct element |
| 23(b) | ( –3 –3 7 ) | **2** | **M1** for any 1 × 3 matrix<br>If 0 scored, **SC1** for $\begin{pmatrix} -3 \\ -3 \\ 7 \end{pmatrix}$ |
| 24(a) | ruled line from ( 0, 0 ) to (30, 20)<br>**and**<br>ruled line from (30, 20) to (90, 20)<br>**and**<br>ruled line from (90, 20) to (110, 0) | **2** | **B1** for a graph with one error |
| 24(b) | 1700 nfww | **2** | **M1** for a correct attempt to find a relevant area under the graph,<br>or **B1** for two of 300, 1200, 200. |
| 25(a) | 3**p** | **1** | |
| 25(b) | $\frac{1}{2}$( 3**p** + 5**q** ) oe | **1** | |
| 25(c) | $\frac{1}{2}$( 3**p** + 9**q** ) oe | **1** | **FT** 2**q** oe + *their* **(b)** isw |
| 25(d) | 1.5 oe | **2** | **B1** for [ $\overrightarrow{DE}$ = ] **p** + 3**q** **;** or for *k*( **p** + 3**q**) |

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