Cambridge O Level

**Cambridge Assessment International Education**
Cambridge Ordinary Level

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

Paper 1 **October/November 2019**

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 2019 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).

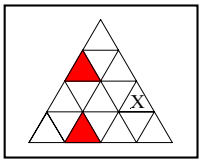
GENERIC MARKING PRINCIPLE 6:

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**

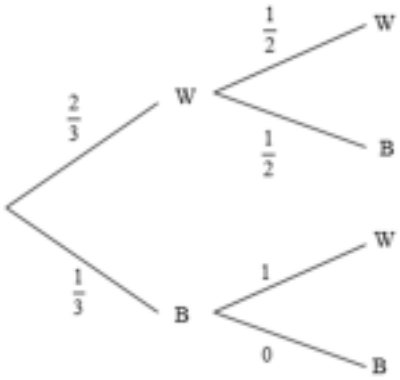
| | |
|---|---|
| cao | correct answer only |
| dep | dependent |
| FT | follow through after error |
| isw | ignore subsequent working |
| oe | or equivalent |
| SC | Special Case |
| nfww | not from wrong working |
| soi | seen or implied |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 1(a) | $\frac{7}{8}$ oe | **1** | |
| 1(b) | $\frac{5}{6}$ oe | **1** | |
| 2 | 0.03 $\frac{7}{200}$ 4% $\frac{1}{20}$ $\frac{3}{50}$ | **2** | **B1** for four correct when one is covered up<br>If 0 scored, **SC1** for answer<br>$\frac{3}{50}$ $\frac{1}{20}$ 4% $\frac{7}{200}$ 0.03 |
| 3(a) | 37 cao | **1** | |
| 3(b) | 36 cao | **1** | |
| 3(c) | $\sqrt{35}$ cao | **1** | |
| 4 | 0.1 oe | **2** | **M1** for $8x + 2x = 7 - 6$ oe |
| 5(a) | $(7+3t)(7-3t)$ final answer | **1** | |
| 5(b) | $(5x-2)(3y+1)$ final answer | **2** | **B1** for one correct partial factorisation seen |
| 6(a) | 8.27 pm or 20 27 | **1** | |
| 6(b) | 97.5 | **1** | |
| 7(a) | Acceptable line through the centre of the circle | **1** | |
| 7(b) |  | **1** | |
| 8 | 40 **and** 9 **and** 0.6 seen,<br>**and**<br>final answer 200 | **2** | **B1** for two of 40, 9, 0.6 seen |

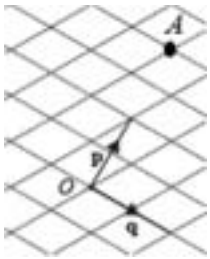
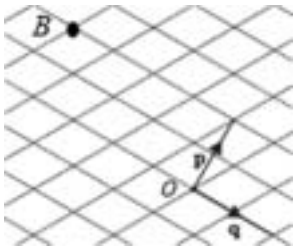
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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 9(a) | 35 | **1** | |
| 9(b) | 8 | **2** | **B1** for $\left(\frac{2}{5}\right)^2$ oe soi |
| 9(c) | 40 000 | **1** | |
| 10 | $\frac{2t}{3}$ | **2** | **B1** for "$k$" = $2t$ oe if $y = \frac{"k"}{x}$ used<br>or **M1** for $2 \times t = 3 \times y$ oe<br>or **M1FT** for $y = \frac{(their\ k)}{3}$ when $y = \frac{"k"}{x}$ used |
| 11(a) | $4.5 \times 10^9$ cao | **1** | |
| 11(b) | $6 \times 10^{-6}$ cao | **2** | **B1** for $0.6 \times 10^{-5}$ seen<br>or for 0.000 006 seen<br>or for final answer $A \times 10^{-6}$ with $1 < A < 10$ |
| 12 | 1800 | **2** | **M1** for $(12 - 2) \times 180$ oe |
| 13(a) | 1 cao | **1** | |
| 13(b) | $9x^6$ final answer | **1** | |
| 13(c) | $\frac{x}{2}$ final answer | **2** | **B1** for $\left(\frac{x^3}{8}\right)^{\frac{1}{3}}$ seen or for $\left(\frac{2}{x}\right)^{-1}$ seen |
| 14(a) | 36.6 cao | **2** | **M1** for 20th percentile = 24 soi |
| 14(b) | 36 or 37 or 38 | **2** | **M1** for 100 people < 37.0 soi<br>or 62 or 63 or 64 people < 36.8 soi |
| 15(a) | 16 | **1** | |
| 15(b) | Rectangle: base 1 to 2, height 6 **and** Rectangle: base 6 to 8, height 2 | **2** | **B1** for one correct rectangle |
| 16(a) | 59° | **1** | |
| 16(b) | Triangle *ARO* shaded | **1** | |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 17(a) | Correct tree diagram with four branches added and the five correct probabilities $\frac{2}{3}, \frac{1}{2}, \frac{1}{2}, 1, [0]$   | **2** | **B1** for at least two second branches drawn and 2 or 3 probabilities completed correctly |
| 17(b) | 0 | **1** | |
| 18(a) | $(7 – (–1))^2 + (0 – 6)^2$ | **M1** | |
| | $BC = 10$ | **B1** | |
| | correct completion to $AB = BC$ [ = 10] | **A1** | |
| 18(b) | 40 | **2** | **M1** for $\frac{1}{2} \times their(BC) \times (7 – (–1))$ oe |
| 19(a) | Acceptable triangle $ABC$ with intersecting arcs at $C$ | **2** | **B1** for an acceptable $C$ clearly indicated with no/incorrect arcs<br>If 0 scored, **SC1** for correct triangle $ABC$ with arcs drawn below the line |
| 19(b) | Acceptable triangle $ABD$ | **2** | **B1** for one correct angle drawn<br>If 0 scored, **SC1** for correct triangle $ABD$ drawn above the line |
| 20(a) | 34° cao | **1** | |
| 20(b) | 68° cao | **1** | |
| 20(c) | 77° cao | **1** | |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 21(a) | *A* positioned correctly<br> | **1** | |
| 21(b) | *B* positioned correctly<br> | **1** | |
| 21(c) | **2q** – **p** oe | **2** | **B1** for 2**q** oe or for – **p** oe<br>If 0 scored, **SC1** for answer **p** – 2**q** |
| 22 | 1.6 oe | **3** | **M2** for $5 \times 4 \times h = 400 \times 0.08$ oe<br>or **M1** for $400 \times 0.08$ or for $\frac{0.08}{5 \times 4}$ |
| 23(a) | Using gradient = $\frac{6}{12}$ | **1** | |
| 23(b)(i) | 4 | **1** | |
| 23(b)(ii) | $\frac{1}{3}$ oe | **1** | |
| 23(c)(i) | –2 | **1** | |
| 23(c)(ii) | –6 | **1** | **FT** 3×*their*(c)(i) |
| 24(a) | $\begin{pmatrix} 5 & -5 \\ -4 & 4 \end{pmatrix}$ | **2** | **B1** for two or three correct elements |
| 24(b) | $\begin{pmatrix} 2 & -2 \\ 0 & 1 \end{pmatrix}$ oe isw<br>or $2\begin{pmatrix} 1 & -1 \\ 0 & \frac{1}{2} \end{pmatrix}$ oe isw | **2** | **B1** for $k\begin{pmatrix} 1 & -1 \\ 0 & \frac{1}{2} \end{pmatrix}$ oe with $k \neq 2$ or 0<br>or for $2\begin{pmatrix} . & . \\ . & . \end{pmatrix}$ oe |
| 24(c) | $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ | **2** | **M1** for using **X** is a 2 by 1 matrix<br>If 0 scored, **SC1** for a final answer of (2 –1) |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 25(a) | 3.2 oe | **1** | |
| 25(b) | 240 | **2** | **M1** for $\frac{1}{2} \times 10 \times (8 + 40)$ oe |
| 25(c) | 28 | **2** | **M1** for $(60 - 10) \times 0.4$ oe<br>or for $0.4 = \frac{v - 8}{60 - 10}$ oe |

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