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# Cambridge IGCSE™

**MATHEMATICS** **0580/22**

Paper 2 (Extended) **February/March 2024**

MARK SCHEME

Maximum Mark: 70

**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 February/March 2024 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 descriptions 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, non-integer 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 or sign 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 A or B 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 | 7h 28min | **1** | |
| 2 | 24.352 | **1** | |
| 3 | $3m+10k$ final answer | **2** | **B1** for $3m$ or $10k$ in final answer or for $3m+10k$ seen and spoilt |
| 4 | $a = 18$ $b = 10$ $c = 4$ $d = 9$ | **4** | **B1** for each<br>If 0 scored, **SC1** for $b$ or $c$ = 4, 5 or 10 |
| 5(a) | 54 | **2** | **M1** for $\frac{3}{20}[\times 360]$ oe or $\frac{360}{20}[\times 3]$ oe |
| 5(b) | $\frac{17}{20}$ oe | **1** | |
| 6 | $\begin{pmatrix}-10\\3\end{pmatrix}$ final answer | **1** | |
| 7 | Positive | **1** | |
| 8(a) | –2 1 6 | **2** | **B1** for any 2 correct in correct position<br>If 0 scored **SC1** for $-3-2$ 1 |
| 8(b) | $3^{n-1}$ | **2** | **B1** for $3^{an+k}$ , $a \neq 0$<br>or $3^c$ for any integer c>1 |
| 9 | $(4,3)$ | **2** | **B1** for each<br>or **M1** for $3 = 2x - 5$ or better |
| 10 | 26.6 | **2** | **M1** for $\frac{1}{2}\times(5.3+8.7)\times 3.8$ oe |

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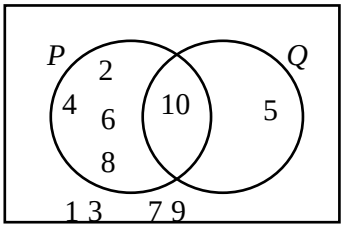
| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 11 | $\frac{5}{4}$ or $\frac{1}{4}+\frac{1}{6}$ | **B1** | Correct method for dealing with mixed number<br>Allow $\frac{5k}{4k}$ |
| | $\frac{15}{12}$ and $\frac{10}{12}$ | **M1** | Correct method to find common denominator<br>e.g. $[1]\frac{3}{12}$ and $\frac{10}{12}$ |
| | $\frac{5}{12}$ cao | **A1** | |
| 12 | 14 | **1** | |
| 13 | 287 | **2** | **M1** for 360 – (180 – 107) oe<br>or indicates correct angle on a diagram |
| 14 | 146 cao | **3** | **M2** for $\frac{1750+480}{55\times1000}\times60\times60$ oe<br>or **M1** for distance = 1750 + 480 oe<br>or $\frac{55\times1000}{60\times60}$ oe soi<br>or correctly writing *their* whole number of seconds from a more accurate answer seen |
| 15(a)(i) | reflection<br>$x = -2$ | **2** | **B1** for each |
| 15(a)(ii) | enlargement<br>[sf] $\frac{1}{2}$<br>$(-3,-4)$ | **3** | **B1** for each |
| 15(b) | Image at $(0,3)$, $(-4,3)$, $(-3,-1)$ | **2** | **B1** for correct size and orientation, wrong centre |
| 16 |  | **2** | **B1** for two sections correct out of four |

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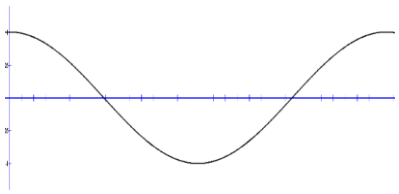
| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 17 | 138.425 | **4** | **M1** for mid-points soi (110, 125, 140, 170)<br><br>**M1** for use of $\Sigma fh$ with $h$ in correct interval including both boundaries<br><br>**M1** for (dep on 2nd M1) for $\Sigma fh$ ⩾ 200 |
| 18 | $14x^3$ | **2** | **B1** for $14x^k$ or $7x^3$ or $2x^3$ |
| 19 | 2325 | **3** | **M2** for correct method for total area e.g. $\frac{1}{2}\times 15\times(190+120)$<br><br>or **M1** for correct method for one area e.g. $\frac{1}{2}\times 20\times 15$, (140 – 20) × 15 or $\frac{1}{2}\times(190-140)\times 15$ oe |
| 20 | 5.36 or 5.360 to 5.361 | **2** | **M1** for $\frac{1}{2}\times 5.6\times 4.9\times\sin 23$ oe |
| 21(a) | $\frac{1}{5}$ oe | **1** | |
| 21(b) | $64x^9$ | **2** | **B1** for $64x^k$ or $kx^9$ as final answer or correct answer spoiled |
| 22 | $[y=]\frac{24}{(x+3)^2}$ oe final answer | **2** | **M1** for $y=\frac{k}{(x+3)^2}$ |
| 23(a) |  <br>Correct sketch to go through (0, 1), close to (360, 1) and reasonably close to (180, –1) | **2** | **M1** for correct cosine curve shape through (0, 1) |
| 23(b) | 72.9 and 287.1 | **2** | **B1** for one correct<br><br>If 0 scored, **SC1** for two angles with a sum of 360 |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 24 | [$a$ =] 64<br>[$b$ =] −8 | **2** | **B1** for each<br>or for both $(x-8)^2$ and $x^2-16x+64$ |
| 25 | $\frac{2}{3}$ oe nfww | **4** | **M3** for $\frac{2}{13}\times\frac{11}{12}+\frac{5}{13}\times\frac{8}{12}+\frac{6}{13}\times\frac{7}{12}$ oe<br>or $1-\left(\frac{2}{13}\times\frac{1}{12}+\frac{5}{13}\times\frac{4}{12}+\frac{6}{13}\times\frac{5}{12}\right)$ oe<br>or **M2** for sum of three or more correct product pairs and no incorrect pairs<br>or for $\frac{2}{13}\times\frac{1}{12}+\frac{5}{13}\times\frac{4}{12}+\frac{6}{13}\times\frac{5}{12}$ and no other pairs<br>or **M1** for $\frac{j}{13}\times\frac{k}{12}$<br>If 0 scored **SC1** for answer $\frac{104}{169}$ oe |
| 26 | $y=\frac{2}{3}x+\frac{4}{3}$ final answer | **5** | **B1** for midpoint $(4,4)$ soi<br>**M1** for [gradient $AB$ =] $\frac{7-1}{2-6}$ oe<br>**M1** for [$m$ =] $\frac{-1}{\textit{their}\text{ gradient of }AB}$<br>**M1** for substituting *their* midpoint into $y=(\textit{their}\ m)x+c$ dep on at least M1 earned |

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