



## Cambridge O Level

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**MARINE SCIENCE**

**5180/02**

Paper 2

**May/June 2023**

MARK SCHEME

Maximum Mark: 60

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**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 May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **12** printed pages.

**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.

## Science-Specific Marking Principles

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|---|--|
| 1 | Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.  |
| 2 | The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.  |
| 3 | Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).  |
| 4 | The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.   |
| 5 | <p><u>'List rule' guidance</u></p> <p>For questions that require <b><i>n</i></b> responses (e.g. State <b>two</b> reasons ...):</p> <ul style="list-style-type: none"> <li>• The response should be read as continuous prose, even when numbered answer spaces are provided.</li> <li>• Any response marked <i>ignore</i> in the mark scheme should not count towards <b><i>n</i></b>.</li> <li>• Incorrect responses should not be awarded credit but will still count towards <b><i>n</i></b>.</li> <li>• Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should <b>not</b> be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response.</li> <li>• Non-contradictory responses after the first <b><i>n</i></b> responses may be ignored even if they include incorrect science.</li> </ul> |

**6** Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g.  $a \times 10^n$ ) in which the convention of restricting the value of the coefficient ( $a$ ) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

**7** Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

**PUBLISHED****MARKING INSTRUCTIONS**

Examiners are reminded that these instructions and the Mark Scheme are **STRICTLY CONFIDENTIAL**.

- Refer to the ***Instructions for Examiners (marking scripts on-screen) 2016*** booklet for details of all procedures.
- As soon as you are able (usually about two days after the paper set date), please access the question paper and provisional mark scheme from the **RM support portal**. In conjunction with the provisional mark scheme, browse scripts in **RM Assessor (scoris)** and feed any issues or comments to your **Team Leader**.
- The decisions of the **Principal Examiner** are final, and the final agreed mark scheme must be applied as intended by the Principal Examiner. If you are in any doubt about applying this mark scheme, consult your **Team Leader** by telephone or by email.
- Please report any serious problems during marking to your **Team Leader / Principal Examiner** (details in the confidential package).
- If you require technical support, please contact the **RM Helpdesk**. If you require administrative support relating to the examination process, please contact the **CIE Examiner Helpdesk**. For all queries relating to payment, please contact **Cambridge Assessment Finance Division**. Up-to-date contact details for each of these can be found in the ***Instructions for Examiners (marking scripts on-screen) 2016*** booklet.

**Key Points**

- 1 The schedule of dates is very important. It is essential that you meet the Batch 1 and Batch 2 deadlines. If you experience problems, you must contact your Team Leader without delay.
- 2 Mark strictly to the mark scheme. All marks awarded must relate directly to the mark scheme. However, always credit correct, relevant, science, even if it lies outside of the syllabus content. For answers not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.
- 3 Never transfer marks allocated for one question item to another.
- 4 Where work has been crossed out, mark it when nothing else has been written.
- 5 Watch for context and scientific correctness. A correct phrase should be discounted if contradictory or incorrect associations are later made within the same response, not just the same sentence. Wrong science that is irrelevant to the question should be ignored.
- 6 Do not select correct answers from lists. If two responses are asked for, mark the first two responses only. In terms of awarding credit, ignore any extra responses, whether correct or incorrect. However, extra responses must still be checked for contradictions. Any extra responses that contradict one of the responses that have been awarded credit will negate credit for the corresponding correct response.
- 7 Treat numbered lines as lists. More than one response per line can be credited, unless each line has a corresponding mark allocation.
- 8 Spellings of syllabus terms that could be ambiguous must be correct (for example El Niño, to avoid confusion with La Niña).

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- 9 Spellings of syllabus terms that are clear and not ambiguous can be accepted if recognisably correct (e.g. akinaderm).
- 10 Do not penalise grammatical constructions/spelling of words that are not in the syllabus, so long as the meaning is clear.
- 11 Credit should be given to all the candidate's correct responses, wherever they have been written (including blank pages, around diagrams, etc.).
- 12 Additional materials may be attached and must be checked for candidates' responses. Show that you have checked blank pages for answers by placing an annotation on each blank page. Do not use crosses or ticks for this purpose, unless the points are credited as part of a response to a specific question. In this instance, please use the On Page Comment tool to clearly annotate which question part the marks relate to.
- 13 If the candidate has left an answer blank, or has left a mark/comment that does not in any way relate to the question (for example 'my dog is black' or '----') use the **NR** (No Response, #) option.
- 14 Award 0 marks for any attempt which shows that the candidate has processed but been unable to answer the question, for example by them simply copying out the question or writing 'can't do', '?' etc.
- 15 This mark scheme will use the following abbreviations:

;	separates marking points
/	separates alternatives within a marking point
()	contents of brackets are not required but should be implied / the contents set the context of the answer
R	reject
A	accept (answers that are correctly cued by the question or guidance you have received)
I	ignore (mark as if this material was not present)
AW	alternative wording (where responses vary more than usual, accept other ways of expressing the same idea)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
• <u>underline</u>	actual word underlined must be used by the candidate (grammatical variants excepted)
• MAX	indicates the maximum number of marks that can be awarded
• +	statements on both sides of the + are needed for that mark
• OR	separates two different routes to a mark point and only one should be awarded
• ECF	error carried forward (credit an operation from a previous incorrect response)

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Question	Answer	Marks
1 (a)(i)	linear scale for y axis that uses half or more of grid ; both axes labelled ; all points plotted correct ; points joined with straight lines ; key for lines / lines labelled ;	<b>5</b>
1(a)(ii)	increase and decrease / <b>AW</b> ; peak at 2014 / 50 (000) (kg) ;	<b>2</b>
1(a)(iii)	<p><i>max 2 of:</i> (increase / from 2012 / up to 2015, due to):</p> <ol style="list-style-type: none"> <li>1 high food / anchovies / <b>AW</b> ;</li> <li>2 high(er) demand / fishing intensity / fishing effort / better fishing equipment / <b>AW</b> ;</li> <li>3 high(er) reproduction / recruitment / <b>AW</b> ;</li> <li>4 migration into the area / <b>AW</b> ;</li> </ol> <p><i>max 2 of:</i> (decrease / after 2015, due to):</p> <ol style="list-style-type: none"> <li>5 less / low, food / few(er) anchovies / <b>AW</b> ;</li> <li>6 reduced demand / <b>AW</b> ;</li> <li>7 low(er) rate of reproduction / migration out from area / <b>AW</b> ;</li> <li>8 disease / <b>AW</b> ;</li> <li>9 overfishing / catching above maximum sustainable yield / <b>AW</b> ;</li> </ol>	<b>3</b>
1(b)(i)	42 (%) ;	<b>1</b>
1(b)(ii)	<p><i>any 2 of:</i></p> <ol style="list-style-type: none"> <li>1 anchovy populations are seasonal / anchovies may not be around that time of year / <b>AW</b> ;</li> <li>2 tuna eat other species / other prey species may be more abundant / <b>AW</b> ;</li> <li>3 anchovies are eaten by other predators / species / <b>AW</b> ;</li> <li>4 may have already been digested / may not be easy to identify (when partially digested) / <b>AW</b> ;</li> <li>5 tuna may have migrated from other areas / <b>AW</b> ;</li> </ol>	<b>2</b>



Question	Answer	Marks
1(c)	<p><i>any 2 of:</i></p> <ul style="list-style-type: none"> <li>1 quotas / limits on catch / <b>AW</b> ;</li> <li>2 boat restrictions / <b>AW</b> ;</li> <li>3 gear / method, restrictions / <b>AW</b> ;</li> <li>4 closed seasons / <b>AW</b> ;</li> <li>5 closed areas / MPAs / protection of areas / <b>AW</b> ;</li> <li>6 surveillance / monitoring / <b>AW</b> ;</li> <li>7 licences / legislation / issuing of fines / laws / <b>AW</b> ;</li> <li>8 size / age restrictions / <b>AW</b> ;</li> </ul>	<b>2</b>

Question	Answer	Marks
2(a)(i)	<p><i>any 1 of:</i></p> <ul style="list-style-type: none"> <li>carbohydrate ;</li> <li>fibre ;</li> <li>water ;</li> </ul>	<b>1</b>
2(a)(ii)	528 (g) ;	<b>2</b>
2(a)(iii)	<p><i>any 2 of:</i></p> <ul style="list-style-type: none"> <li>low(er) fat / energy ;</li> <li>less risk of obesity / heart disease / diabetes / <b>AW</b> ;</li> <li><b>OR</b></li> <li>more / high protein ;</li> <li>for growth / repair / muscles / enzymes / antibodies / <b>AW</b> ;</li> <li><b>OR</b></li> <li>more / high, iron ;</li> <li>for haemoglobin / for <u>red</u> blood cells / for oxygen transport / <b>AW</b> ;</li> <li><b>OR</b></li> <li>more / high, Vitamin D ;</li> <li>for bones / teeth / <b>AW</b> ;</li> </ul>	<b>4</b>
2(b)(i)	protein / (poly)peptide ;	<b>1</b>

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Question	Answer	Marks
2(b)(ii)	20 ;; gram per day ;	3
2(b)(iii)	<p><i>any 4 of:</i></p> <ul style="list-style-type: none"> <li>1 (both have) similar growth rates / similar final masses ;</li> <li>2 (both have) similar / same, amino acid content / <b>AW</b> ;</li> <li>3 (using insects) reduces overfishing (of other species) / less loss of other species / less loss of biodiversity / <b>AW</b> ;</li> <li>4 (using insects) has reduced impact on <u>food chains</u> / <u>food webs</u> ;</li> <li>5 (insect pellets produce) more faeces / less food digested / absorbed / <b>AW</b> ;</li> <li>6 (using insects / the faeces) produces pollution ;</li> <li>7 (using insects) causes (more) eutrophication / algal bloom / <b>AW</b> ;</li> <li>8 (using insects) causes reduced oxygen (due to eutrophication) / <b>AW</b> ;</li> </ul>	4
3(a)	<p><i>any paired 2 of:</i></p> <p>wood ; easily shaped / low density / does not corrode / does not rust / cheap / easy to repair / strong / <b>AW</b> ;</p> <p><b>OR</b></p> <p>fibreglass / fibre reinforced plastic / FRP ; light / easy to repair / does not corrode / does not rust / strong / does not rot / <b>AW</b> ;</p> <p><b>OR</b></p> <p>aluminium ; light / malleable / strong / does not corrode / does not rust / does not rot / easily shaped / <b>AW</b> ;</p>	2
3(b)	<p><i>max 3 of:</i></p> <ul style="list-style-type: none"> <li>1 many / multiple, hooks ;</li> <li>2 <u>barbed</u> hooks ;</li> <li>3 bait on hooks ;</li> <li>4 towed from (end of) boats ;</li> <li>5 floats / buoys attached (to the line) / <b>AW</b> ;</li> </ul> <p><i>and any 1 of:</i></p> <ul style="list-style-type: none"> <li>6 bycatch / non-target species / <b>AW</b> ;</li> <li>7 <i>idea that</i> (seabirds / turtles / <b>AW</b>) take bait and suffocate / drown / <b>AW</b> ;</li> <li>8 organisms become tangled / <i>idea that</i> loss of lines leads to ghost lines / <b>AW</b> ;</li> </ul>	5

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Question	Answer	Marks
3(c)	<p><b>any 8 of:</b></p> <ol style="list-style-type: none"> <li>1 induction, compression, power / combustion, exhaust ;</li> <li>2 (in induction) intake valve opens ;</li> <li>3 (in induction) piston moves down ;</li> <li>4 (in induction) (so) air / gas, enters (cylinder) ;</li> <li>5 (in compression) (inlet / both) valve(s) close ;</li> <li>6 (in compression) piston (moves up and) compresses air / fuel ;</li> <li>7 (in compression) fuel / diesel, is injected / <b>AW</b> ;</li> <li>8 (in compression / power / combustion) (fuel) ignites / burns / combusts ;</li> <li>9 (in power / combustion) piston forced / moves, down / <b>AW</b> ;</li> <li>10 (in exhaust) <u>outlet</u> / <u>exhaust</u>, <u>valve</u> opens ;</li> <li>11 (in exhaust) fumes / smoke / (waste) gases, leave (when piston moves up) ;</li> </ol>	<b>8</b>
4(a)	<p><b>any 4 of:</b></p> <ol style="list-style-type: none"> <li>1 (originally) one (super)continent / Pangaea, present ;</li> <li>2 Pangaea / (super)continent, broke up (into continents) / <b>AW</b> ;</li> <li>3 <u>plates</u> <u>float on</u> <u>mantle</u> / <b>AW</b> ;</li> <li>4 <u>plates</u> move / collide / pull apart / <b>AW</b> ;</li> <li>5 (plates move due to) convection currents (in mantle) ;</li> <li>6 hot magma has lower density and moves up / <b>AW</b> ;</li> <li>7 as magma cools, density increases and magma sinks / <b>AW</b> ;</li> </ol>	<b>4</b>
4(b)(i)	<p><b>any 3 of:</b></p> <p>carbon dioxide <u>and</u> water used ;</p> <p>light (energy) ;</p> <p>chlorophyll <u>absorbs</u> / <u>traps</u> light ;</p> <p>glucose <u>and</u> oxygen produced ;</p>	<b>3</b>

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Question	Answer	Marks
4(b)(ii)	<p><i>any 8 of:</i></p> <ol style="list-style-type: none"> <li>1 temperature ;</li> <li>2 turbidity / cloudiness / particles / sediment / <b>AW</b> ;</li> <li>3 (affects) light ;</li> <li>4 wave action / tides, / turbulence / <b>AW</b> ;</li> <li>5 (dissolved) carbon dioxide ;</li> <li>6 (affect) <u>photosynthesis</u> (rate) ;</li> <li>7 pH / acidity ;</li> <li>8 affects enzymes ;</li> <li>9 salinity ;</li> <li>10 affects water movement (in and out of cells) / osmosis ;</li> <li>11 upwelling / ocean currents / run-off, affects nutrient / nitrate / phosphate / minerals / (inorganic) solutes / availability ;</li> <li>12 nitrates for protein synthesis / phosphates for nucleic acids ;</li> <li>13 oxygen for respiration ;</li> </ol>	<b>8</b>