



## Cambridge O Level

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**MARINE SCIENCE**

**5180/01**

Paper 1 Structured

**October/November 2022**

**MARK SCHEME**

Maximum Mark: 80

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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 October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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This document consists of **13** printed pages.

**PUBLISHED****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**

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 'List rule' guidance

For questions that require *n* responses (e.g. State **two** reasons ...):

- The response should be read as continuous prose, even when numbered answer spaces are provided.
- Any response marked *ignore* in the mark scheme should not count towards *n*.
- Incorrect responses should not be awarded credit but will still count towards *n*.
- Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** 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.
- Non-contradictory responses after the first *n* responses may be ignored even if they include incorrect science.

**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

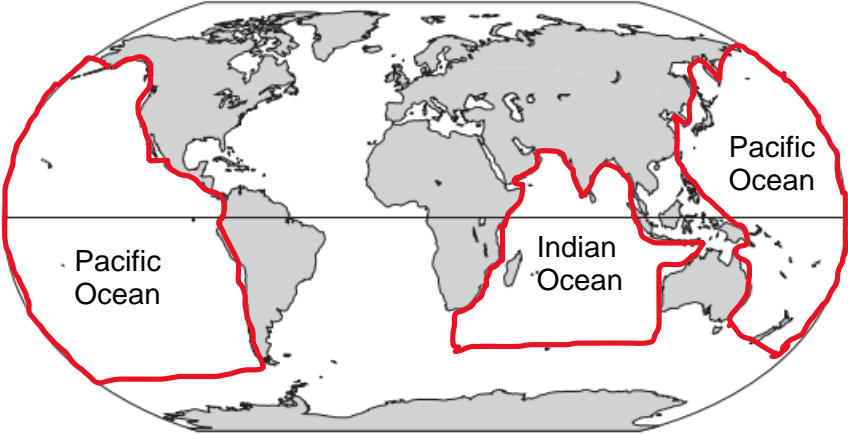
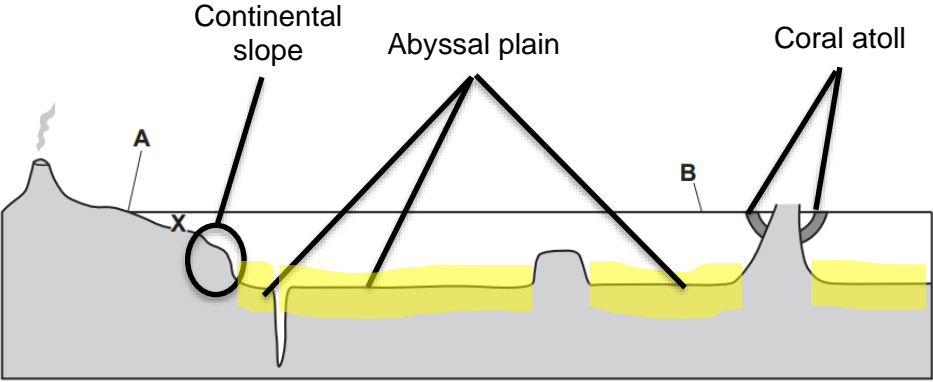
Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

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

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This mark scheme will use the following abbreviations:

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

Question	Answer	Marks
1(a)		2
1(b)(i)		3
1(b)(ii)	<p>(A) will be lower (salinity) ;</p> <p>river water is fresh water / river water dilutes sea water / river water has low salinity / fresh water (from river) mixes with ocean water ;</p>	2
1(b)(iii)	<p>evaporation / precipitation ;</p>	1

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Question	Answer	Marks
1(c)	<i>Any 2 from</i> run off / river, carries nutrients / minerals / fertilisers (from land) ; (nutrients / minerals / fertilisers) used by producers / increases primary production / <u>more</u> producers or phytoplankton ; (more food from river water) increases food supply for consumers ; biomass / energy, passes up the food chain ; more habitats / niches at <b>X</b> ;	<b>2</b>

Question	Answer	Marks
2(a)(i)	echinoderm ;	<b>1</b>
2(a)(ii)	locomotion / movement ;	<b>1</b>
2(a)(iii)	<i>Any 3 from</i> (females) release / produce eggs + (males) <u>release</u> sperm ; synchronized / at the same time ; millions of gametes released ; due to low chance of meeting ; external, fertilisation / fusion ; planktonic larvae (OWTTE) ;	<b>3</b>
2(b)(i)	13.1–13.7 (a.u.)	<b>1</b>
2(b)(ii)	overfished / declining / poor / value is declining ; <i>Plus any 1 from:</i> higher percentage / more, of the catch is low value ; lower percentage / less, of the catch, is, middle / high, value catch; AVP ;	<b>2</b>

Question	Answer	Marks
2(b)(iii)	<p>Any <b>2</b> pairs from            ban, fishing for middle / high value species / all species OR close the fishery ;            allows species to, reproduce <b>and</b>, recover / grow / repopulate / population to increase ;</p> <p>select an area to make into an MPA / closed / protected area ;            allows (long term) recovery / repopulation of these species / overspill of the species into nearby areas ;</p> <p>determine MSY and fish <u>below</u> this level ;            leaves enough to reproduce / allows regeneration of populations ;</p> <p>close fishery during spawning period / restriction on season ;            allows mature specimens to complete reproductive cycle / they can reproduce undisturbed ;</p> <p>AVP ;;</p>	<b>4</b>
2(c)(i)	<p>(For 1 mark) longer / larger, sea cucumbers achieve a higher price / are more expensive / cost more (per kg) ;</p> <p>(For 2 marks) exponential increase / very rapid increase in value, for small length increase of larger sea cucumbers ;</p>	<b>2</b>
2(c)(ii)	<p>Any <b>3</b> from            7 cm specimens are of a low value ;            overfishing would occur ;            less reproduction ;            decline in stock / population goes down ;            10 cm allows growth of organisms to maturity ;            can reproduce (before being captured) / increases population ;</p>	<b>3</b>

Question	Answer	Marks
3(a)(i)	5 ;	<b>1</b>
3(a)(ii)	octopus ;	<b>1</b>
3(a)(iii)	triggerfish + octopus + (reef) shark ;	<b>1</b>
3(a)(iv)	<p><u>10% biomass</u> is transferred / 90% of biomass is lost ;            due to respiration / excretion (urea or carbon dioxide) / urination ;            not all organisms at one trophic level eaten / indigestible parts / decomposition of dead organisms / egestion / faeces ;</p>	<b>3</b>



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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
3(b)	(algae population will) increase as, fewer urchins eating them / fewer <u>primary</u> consumers / fewer herbivores ; triggerfish population decreases as, fewer sea urchins <u>to eat</u> / less food;	<b>2</b>
3(c)(i)	growth / repair ;	<b>1</b>
3(c)(ii)	<u>amino acids</u> ;	<b>1</b>
3(c)(iii)	<i>Any 2 from</i> water / vitamins / minerals / carbohydrate / fats or lipids / (dietary) fibre ;	<b>1</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(a)(i)	<i>Any 3 from</i> lagoon ; lift net ; diver scares fish over the net / lights used to attract fish (at night) ; net lifted ;	<b>3</b>
4(a)(ii)	<i>Any 2 from</i> bait well ; (moving) water ; (provides oxygen) to keep alive ;	<b>2</b>
4(a)(iii)	<i>Any 3 from</i> chummer ; squeezes bait ; to incapacitate ; thrown to sea ; to attract tuna ; into feeding frenzy ; higher concentration of / more, tuna to fish from ;	<b>3</b>

Question	Answer	Marks
4(b)	Any <b>2</b> from kept cool / iced / frozen ; gutted / bled; arranged belly up ; cleaned / washed ; handle with care ;	<b>2</b>
4(c)	Any <b>3</b> from chilling / freezing ; canning ; irradiation / gamma rays / cobalt 60 / caesium 137 ; drying ; smoking ; salting ; pickling ;	<b>3</b>
4(d)	oxidation ; of fats / lipids / fatty acids ;	<b>2</b>

Question	Answer	Marks												
5(a)	<table border="1"> <thead> <tr> <th>feature</th> <th>wet monsoon</th> <th>dry monsoon</th> </tr> </thead> <tbody> <tr> <td>wind direction</td> <td>onshore <b>(and)</b></td> <td>offshore</td> </tr> <tr> <td>temperature</td> <td>high <b>(and)</b></td> <td>low</td> </tr> <tr> <td>rainfall</td> <td>high <b>(and)</b></td> <td>low</td> </tr> </tbody> </table>	feature	wet monsoon	dry monsoon	wind direction	onshore <b>(and)</b>	offshore	temperature	high <b>(and)</b>	low	rainfall	high <b>(and)</b>	low	<b>3</b>
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5(b)	species richness / number of different species / range of species ; (and) the number of each species ;	<b>2</b>												

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(a)	compass shows, direction / North;  <i>plus any 2 from:</i> used to find position ; (chart) shows water depth ; (chart) shows dangers to navigation / location of buoys / lighthouses / lightships / other named navigational points ;	<b>3</b>
6(b)	<i>Any 2 from</i> indicate, (safe) channel / route between them ; may indicate a danger below / to one side of them ; colours of buoys indicate which side to travel past ; may be red / green ;	<b>2</b>
6(c)	<i>Any 2 from</i> detects nearby vessels / objects OR determines, the range / distance, of vessels / objects ; (used in) darkness / foggy conditions ; by sending out and receiving a signal / microwave ; (signals) that bounces off the object ;	<b>2</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
7(a)	<i>Any 2 from</i> (clear water) for <u>more</u> / greater penetration of, sunlight to reach coral ; for <u>rapid</u> photosynthesis ; of zooxanthellae ;	<b>2</b>

Question	Answer	Marks
7(b)	<p>Any <b>3</b> from damages nurse / breeding grounds ;</p> <p>(reef) loss of <u>habitat</u> ; increases turbidity ; damages fish gills / blocks mouths of coral polyps ; reduces biodiversity ;</p> <p>(fisheries) reduces fish availability ; so fewer fish reach maturity to go to main, feeding / fishing, grounds ;</p>	<b>3</b>
7(c)	<p>Any <b>2</b> from provides solid surface for attachment ; of invertebrates / seaweeds / algae (micro or macro); increases biodiversity ; builds fish populations / communities ; reduces wave energy ; reduced flooding / erosion of beaches / damage to littoral zone ; provides shelter / protection ;</p>	<b>2</b>

Question	Answer	Marks										
8(a)	<table border="1" data-bbox="331 1010 687 1339"> <tbody> <tr> <td data-bbox="331 1010 495 1075">kingdom</td> <td data-bbox="495 1010 687 1075">Animal(ia) ;</td> </tr> <tr> <td data-bbox="331 1075 495 1141">Phylum ;</td> <td data-bbox="495 1075 687 1141">mollusca</td> </tr> <tr> <td data-bbox="331 1141 495 1206">class</td> <td data-bbox="495 1141 687 1206">bivalve</td> </tr> <tr> <td data-bbox="331 1206 495 1272">genus</td> <td data-bbox="495 1206 687 1272"><i>Tridacna</i> ;</td> </tr> <tr> <td data-bbox="331 1272 495 1339">species</td> <td data-bbox="495 1272 687 1339"><i>gigas</i> ;</td> </tr> </tbody> </table>	kingdom	Animal(ia) ;	Phylum ;	mollusca	class	bivalve	genus	<i>Tridacna</i> ;	species	<i>gigas</i> ;	<b>4</b>
kingdom	Animal(ia) ;											
Phylum ;	mollusca											
class	bivalve											
genus	<i>Tridacna</i> ;											
species	<i>gigas</i> ;											

Question	Answer	Marks
8(b)	<p><i>Any 2 from</i>  overfishing / overexploitation ;  <u>damaged</u> due to dredging / bottom trawling ;  habitat, loss / damage ;  climate change / global warming ;  sedimentation ;  pollution qualified ;  disease / pathogens / bacteria ;  <u>increased</u> predation ;  reduced food supply ;  ocean acidification / pH of sea water getting lower ;</p>	<b>2</b>
8(c)	Marine Stewardship Council ; International Union for the Conservation of Nature ; AVP ;;	<b>2</b>