

Cambridge IGCSE™

MARINE SCIENCE**0697/12**

Paper 1 Theory and Data Handling

May/June 2024

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 May/June 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **17** 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 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.

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 | <p><u>'List rule' guidance</u></p> <p>For questions that require <i>n</i> responses (e.g. State two reasons ...):</p> <ul style="list-style-type: none"> • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> in the mark scheme should not count towards <i>n</i>. • Incorrect responses should not be awarded credit but will still count towards <i>n</i>. • 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 <i>n</i> 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.

Question	Answer	Marks
1(a)(i)	<i>any 2 of:</i> to dig / excavate a nest ; to lay eggs ; on the beach where (she) hatched ;	2
1(a)(ii)	<i>any 2 of:</i> olfaction / smell ; landmarks / mental map ; (any 2 from) Sun, moon and stars ; (Earth's) magnetic field ;	2
1(a)(iii)	<i>any 2 of:</i> light pollution / noise pollution / littering / plastics pollution ;; may disturb nesting turtles ; may collect eggs, as souvenirs / for food ; land may have hotels built on them ; raise awareness of turtles and their conservation ; fundraising for turtle conservation ;	2
1(a)(iv)	(area in which) fishing / human activities is, prohibited / controlled / limited / restricted ;	1

Question	Answer	Marks
1(b)	<i>any 2 of:</i> food supply ; disease / parasites ; competition ; predation ;	2

Question	Answer	Marks
2(a)	ecosystem habitat species environment the community and its environment interacting together a group of organisms of one species living in the same area at the same time a group of organisms that can reproduce fertile offspring the external biotic and abiotic surroundings of an organism all the populations of different species in one area the area where an organism lives and interacts with its environment and other organisms	4
2(b)(i)	Indian (ocean) ;	1
2(b)(ii)	smaller (/ area of ocean) ORA ; partially enclosed by the, coast / land ;	2
2(b)(iii)	(in Y) river run-off OR coastal upwellings OR nutrients from, land run-off / deep ocean rising to the surface ; to increase <u>growth rate</u> (population or individuals) of, phytoplankton / algae / plants / diatoms / dinoflagellate / (primary) producers ;	2

Question	Answer	Marks
3(a)(i)	J – cell wall ; K – cytoplasm ; L – cell membrane ;	3
3(a)(ii)	controls / allows, movement (of substances) into / out of cell ;	1
3(a)(iii)	vacuole ; OR chloroplast ;	1
3(a)(iv)	mitochondria ; OR nucleus ;	1
3(b)(i)	makes / produces, proteins / amino acids ; for growth (of organism or population) / tissue repair ;	2
3(b)(ii)	(function) decomposers ; (explanation) return nutrients to a form that can be absorbed by organisms ;	2

Question	Answer	Marks
4(a)(i)	the Sun ;	1
4(a)(ii)	B ;	1
4(a)(iii)	loss of energy / particles slow down ; gas turns to liquid / particles become a lot closer together ;	2
4(b)	releases, greenhouse gases / carbon dioxide ; which leads to, climate change / global warming / enhanced greenhouse effect / traps heat / increases global temperatures ; warmer climate causes more evaporation (from the ocean) ; which causes / there is, more precipitation ;	4

Question	Answer	Marks												
5(a)	<table border="1"> <thead> <tr> <th>feature</th><th>name</th><th>function</th></tr> </thead> <tbody> <tr> <td>D</td><td>tentacles</td><td>food capture / defence</td></tr> <tr> <td>E</td><td>mouth</td><td>pass food into body</td></tr> <tr> <td>F</td><td>calcium carbonate skeleton</td><td>protection / hold polyp in place</td></tr> </tbody> </table>	feature	name	function	D	tentacles	food capture / defence	E	mouth	pass food into body	F	calcium carbonate skeleton	protection / hold polyp in place	2
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D	tentacles	food capture / defence												
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F	calcium carbonate skeleton	protection / hold polyp in place												
5 (b)	<i>up to 3 of:</i> (sexual) release of, male and female gametes / eggs and sperm ; fertilization <u>in the water</u> ; characteristics of both parents ; planula formed ; <i>and at least 1 of:</i> (asexual) budding / fragmentation ; produces identical copy of itself ;	3												
5(c)(i)	4 300 000 – 180 000 ; = 4 120 000 ;	2												
5(c)(ii)	less light available ; for photosynthesis ; OR decreased temperature ; reduces rate of photosynthesis ;	2												

Question	Answer	Marks
5(c)(iii)	(condition that changes) increased turbidity of the water / stated temperature change / ocean acidification ; (linked explanation) reduces light (or reduced temperature) for (less) photosynthesis / (increase in temperature / acidification) causes (coral) bleaching (or description) ;	2

Question	Answer	Marks
6(a)(i)	correct readings from graph (approx. 3250 AND 6750) ; 6750 – 3250 = 3500 ; $3500 \div 3250 \times 100 = 107.0769 / 107.077 / 107.08 / 107.1$ (%) ;	3
6(a)(ii)	<i>any 2 of:</i> increased, fish stock / population (of fish) / increased recruitment (of fish stock) / increased spawning rate ; increased boat size catching ; increased fishing effort ; improved / more intensive, fishing method ; started using sonar for fish locations ;	2
6(b)(i)	<i>any 3 of:</i> algae / plankton / phytoplankton, grow below the FAD ; herbivores / small or bait fish, increase in numbers ; larger carnivorous fish / tuna, come to feed ; more boats go to catch / as easier / quicker to catch fish there ;	3

Question	Answer	Marks
6(b)(ii)	<i>any 2 named from:</i> restricting boat size / net types / catching methods / mesh size / quotas and licenses / closed seasons / closed areas / Marine Protected Areas (MPAs) / international agreements ;; (correct explanation) (restricting boat size / net type / mesh size) reduce number of fish caught ; (quotas / licenses) enforce fewer fish being caught ; (closed seasons / closed area) allows adult fish to reproduce (without risk of capture) ; (catching method) more sustainable such as pole and line; (MPA's) provide safe place for reproduction ; AVP ;;	4

Question	Answer	Marks
7(a)(i)	line drawn starting further to the right than existing line ; thermocline shown ; temperature finishes within 1 mm of the existing line ;	3
7(a)(ii)	11 000 (m) ;	1
7(a)(iii)	<i>any 2 of:</i> low temperature ; high pressure ; <u>no</u> sunlight ; low oxygen (concentration) ;	2
7(b)(i)	due to lack of sunlight they may lose their eyes as not functional ; organisms using bioluminescent light need to see their prey so have large eyes ;	2
7(b)(ii)	due to the very high pressure ;	1

Question	Answer	Marks
8(a)	can continue to be, harvested ORA ; (at a rate) that does not deplete that resource / maintains fish stocks ; for the future (generations) ;	3
8(b)(i)	<i>any 6 of:</i> ref. to tanks or cages ; ref. to (humans) feeding the fish ; sourcing of initial brood stock (from the wild) ; maintaining conditions required for the species (temperature, salinity, light, pH, oxygen) ; food requirements (e.g. protein and lipid levels) ; types of feed and their environmental impact (pelleted, other fresh fish or plant-based protein) ; maintaining water quality by removal of waste products OR through adequate, water flow rate / filtration, of waste water, OR moving cages ; size sorting to, prevent cannibalism / allow all fish to get food ; prevention of, entry / spread, of parasites / disease, by using low stocking densities / antibiotics / cleaner species ; prevent entry of predators by netting ; selection of, fastest growing / protein content, organisms as new brood stock ;	6

Question	Answer	Marks
8(b)(ii)	<i>any 3 of:</i> increased (aerobic) respiration by, decomposers / bacteria ; (eutrophication) leads to a reduction in (dissolved) oxygen ; (which) kills the fish / suffocates the fish ; held at high stocking densities ;	3