CAMBRIDGE
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Cambridge IGCSE™

MARINE SCIENCE **0697/21**

Paper 2 Theory and Practical Skills **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.

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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.

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.

Question	Answer	Marks
1(a)(i)	large drawing ; neat, clear lines that are not broken lines and no shading ; (proportions are correct) tentacle width compared to length ; seven tentacles and disc ;	**4**
1(a)(ii)	correct measurement in mm ;	**1**
1(a)(iii)	0.8 ;; (range 0.7–0.8)	**2**
1(b)(i)	eukarya ; animals ;	**2**
1(b)(ii)	the coral / it has radial (symmetry), echinoderms have pentaradial (symmetry) ;	**1**
1(c)	*any **4** of:* ref. to release of sperm and egg cells into water / **AW** ; external fertilisation ; planktonic larvae (are formed) ; larvae, are moved by currents / drift in currents / feed in surface water / **AW** ; (larvae) sink and attach to substrate / **AW** ; (larvae) become / turn into, (sessile) polyps / **AW** ; asexual reproduction occurs / budding / fragmentation ;	**4**

Question	Answer	Marks
2(a)(i)	Atlantic (ocean) ;	**1**
2(a)(ii)	Mariana trench ;	**1**
2(a)(iii)	*any **3** of:* (prevailing) wind ; rotation / spin, of the Earth ; tides ; differences in water density ;	**3**
2(b)(i)	33–36 (ppt) / 3 (ppt) ;	**1**
2(b)(ii)	*any **3** of:* (in warmer / equatorial areas) high temperature increases evaporation (increasing salinity) / **AW** ; wind increases evaporation (increasing salinity) ; (areas close to land) may have run off from rivers (reducing salinity) / **AW** ; melting of ice / glaciers, causes run off of fresh water (reducing salinity) / **AW** ; different rainfall patterns / precipitation (at different latitudes) ; erosion of rocks releasing ions / salts (increasing salinity) ;	**3**

Question	Answer	Marks
2(c)(i)	*any **3** of:* measure water volume ; use a measuring cylinder / **AW** ; find mass of beaker (using balance) / **AW** ; pour water into beaker and measure combined mass / **AW** ; find mass of water by subtracting mass of beaker from mass of water and beaker / **AW** ; calculate density as mass divided by volume ; **OR** (alternative method) place water into beaker / **AW** ; place hydrometer into water / **AW** ; read where water level is on scale of hydrometer / **AW** ;	**3**
2(c)(ii)	*any **2** of:* warm water rises / floats ; cold water sinks ; warm water has low density / cold water has high density ; as water cools at the surface the density increases / **AW** ;	**2**

Question	Answer	Marks
3(a)(i)	grind / blend, a sample of grouper (with water) ; add biuret solution ; lilac colour produced ;	**3**
3(a)(ii)	growth / repair / energy / **AW** ;	**1**
3(b)	*any **2** of:* (treat with) antibiotics / vaccines / fungicides / **AW** ; quarantine fish / **AW** ; not overstocking / **AW** ; removing diseased fish / **AW** ; addition of cleaner fish ; filter water / ensure flow of water through system / **AW** ;	**2**
3(c)(i)	580 (g) ;	**1**
3(c)(ii)	97 (g per month) ;	**1**

Question	Answer	Marks
3(c)(iii)	*any **2** of:* temperature ; water volume / cage size / **AW** ; salinity ; mass of food / frequency of feeding / mass of pellets / **AW** ; light (intensity) ; species / age / sex, of grouper ; oxygen / aeration / **AW** ;	**2**
3(c)(iv)	*up to **2** of:* *supporting:* the growth of both is similar so profits are unaffected / **AW** ; less fish are taken from sea / wild (to make pellets) / less damage to food chains / **AW** ; plants (grown for pellets) remove carbon dioxide so less global warming / **AW** ; *and up to **2** of:* plant based pellets results in less growth so could produce less profit / **AW** ; more agricultural land used to produce fish food rather than human food / **AW** ; less farmed fish available (due to slower growth) so more wild fish taken / fish is more expensive / **AW** ;	**3**

Question	Answer	Marks
4(a)(i)	linear scale for *y*-axis that uses at least half of axis ; labelled axis and key ; both sets of points plotted ; ; points joined by straight lines ;	**5**
4(a)(ii)	*any **2** of:* both decrease higher up the beach / **AW** ; lugworms are higher (than clams) at, low tide mark / at 0m / **AW** ; clams increase and then decrease ; (generally) more clams than lugworms / **AW** ;	**2**
4(a)(iii)	*any **3** of:* use of quadrat ; run a line transect / **AW** ; sample at intervals ; count number of both species / **AW** ;	**3**

Question	Answer	Marks
4(b)	*any **4** of:* live in U-shaped burrow / able to burrow ; which has low oxygen ; contain haemoglobin ; (haemoglobin) binds to oxygen ; ingest / eat, sand / sediment / **AW** ;	**4**

Question	Answer	Marks
5(a)	*any **4** of:* faeces / waste / dead fish / **AW** ; sinks / **AW** ; decomposes / breaks down (on sea bed) (to release ammonium) ; by bacteria / microbes ; (nitrates) rise with upwellings / **AW** ;	**4**
5(b)(i)	table in a box ; headers with units for 'drops of fertiliser' and for 'oxygen / mg per dm^3' ; one column for fertiliser and two columns for four weeks and eight weeks ; data in order of number of drops and correctly linked ;	**4**
5(b)(ii)	*any **2** of:* algae / phytoplankton grow ; photosynthesis (releases oxygen) ; more drops fertiliser leads to increased algal growth ;	**2**

Question	Answer	Marks
5(b)(iii)	*any **2** of:* *idea that* algae (over) compete for light / not enough light / **AW** ; eutrophication has occurred ; as algae are decomposing ; and, decomposers / microbes / bacteria, respire ;	**2**
5(b)(iv)	*any **2** paired points from:* use measured volumes / masses of fertiliser ; as drops may be different sizes ; **OR** maintain temperature / **AW** ; as temperature will affect rate of photosynthesis / decay / gas solubility ; **OR** do replicates for each ; as one may be anomalous ; **OR** maintain light ; as light affects photosynthesis ;	**4**

Question	Answer	Marks
6(a)(i)	*any **2** of:* towing a net from boat ; net in water column / **AW** ; fish are hauled on boat (in net) / **AW** ;	**2**
6(a)(ii)	bycatch ; **OR** overfishing ;	**1**

Question	Answer	Marks
6(b)	*any **6** of:* area with and area without trawling / **AW** ; Secchi disc / description of one / **AW** ; place (disc) into water / **AW** ; measure length of rope when disc disappears / **AW** ; raise disc until it appears and record length again / **AW** ; calculate mean depth ; repeat ; same time of day / same weather / same light / **AW** ; same disc shape / size / **AW** ; same type of seabed / **AW** ; appropriate safety precautions e.g. lifejackets / GPS / **AW** ;	**6**