CAMBRIDGE
International Education

Cambridge IGCSE™

MARINE SCIENCE **0697/23**

Paper 2 Theory and Practical Skills **October/November 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 October/November 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.

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.

Key Points

- Refer to the ***Instructions for Examiners (marking scripts on-screen) 2021*** 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) 2021*** booklet.
- 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.
- 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.
- Never transfer marks allocated for one question item to another.
- Where work has been crossed out, mark it when nothing else has been written.
- Do not penalise grammatical constructions / spelling of words that are not in the syllabus, so long as the meaning is clear.
- Credit should be given to all the candidate's correct responses, wherever they have been written (including blank pages, around diagrams, etc.).
- 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.
- 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 '----' or 'can't do' or '?') use the **NR** (No Response, #) option.
- Award 0 marks for any attempt which does not earn credit. This includes copying out all / part of the question or any working that does not earn any marks (whether crossed out or not).
- 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
OWTTE other words to that effect

- **underline** 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)

Question	Answer	Marks
1(a)(i)	large diagram that is at least length of image ; no broken lines or shading or scales ; proportions and positions of fins correct ; four fins, eye, lateral line, and mouth clear ;	**4**
1(a)(ii)	correct measurement of the line (cm or mm) = 150 mm ; division of line by 7 and nearest whole number = 2 ;	**2**
1(a)(iii)	correct guideline and label to lateral line ; correct guideline and label to caudal fin ;	**2**
1(b)(i)	*any 2 of:* produce light ; reduce predation / avoid predators / **AW** ; by blending in with light from above / camouflage / **AW** ; attract mates / **AW** ;	**2**
1(b)(ii)	*any 2 of:* avoid predators ; feed, at surface / in sunlight zone ; little / no food in midnight zone / **AW** ;	**2**

Question	Answer	Marks
1(b)(iii)	*any 3 of:* 1 no light in midnight zone / only light in sunlight zone ; 2 no / few, producers in midnight zone / only producers in sunlight zone **AW** ; 3 no photosynthesis in midnight zone / photosynthesis in sunlight zone / **AW** ; 4 lantern fish transfer, energy / food / nutrients / biomass, down to deeper areas (from surface) / midnight zone / **AW** ; 5 provides food / energy, for higher trophic levels / predators / consumers / **AW** ;	**3**

Question	Answer	Marks
2(a)(i)	convergent ;	**1**
2(a)(ii)	*any 3 of:* 1 plates are stuck / locked together / **AW** ; 2 plate movement creates tension / **AW** ; 3 earthquake occurs / plates (suddenly) slip / **AW** ; 4 (large) release of energy / (large) force / pressure wave ; 5 (large body of) water is displaced / **AW** ;	**3**
2(b)(i)	smaller time increments / more frequent readings / less likely to miss a high or low point / less likely to miss a tide height / every 6 minutes rather than every hour / **AW** ;	**1**
2(b)(ii)	can identify anomalies more easily / recognise if waves suddenly surge / can recognise if wind affects results / can see actual height of tide / mechanical version may break / cheaper method / **AW** ;	**1**

Question	Answer	Marks
2(b)(iii)	the readings can be compared / can see if readings are concordant / the recorder may give false readings / human error can affect the ruler reading / can calculate an average / provides 'back up' data / **AW** ;	**1**
2(b)(iv)	9 (am / pm) ;	**1**
2(b)(v)	correct readings from graph (3.8, 0.4) ; subtraction, division by two and 1 dp (1.7 m) ;	**2**
2(b)(vi)	*any 3 of:* high(er) range / big(ger) amplitude / **AW / ORA** ; (because) high tide is higher and low tide is lower / **AW** / **ORA** ; because gravitation effect of Sun and Moon is higher / **AW** / **ORA** ; as they are in a line / **AW** ; so bigger pull on water / **ORA** ; at neap tide they are right angles / **AW** ;	**3**

Question	Answer	Marks
3(a)	*any 2 of:* double hulls ; cannot wash out holds except at special collection sites ; control of sewage release / **AW** ; control of garbage disposal / **AW** ;	**2**

Question	Answer	Marks
3(b)	*any 3 of:* 1 place sea water into boiling tube / beaker / **AW** ; 2 use of universal indicator solution / universal indicator paper / pH meter / **AW** ; 3 blow into water with a straw / <u>bubble</u> carbon dioxide through water / **AW** ; 4 measure, pH / colour, before <u>and</u> after ; 5 red colour indicates acidity / pH below 7 (on meter) indicates acidity ;	**3**
3(c)(i)	table as a box with separate columns ; headings as, time / min(utes), and, height / (water) level, for A and B ; readings all recorded in time order ; units in headers (min(utes) and mm) with only numbers in body of table ;	**4**
3(c)(ii)	*any 3 of:* 1 melting of, floating ice / ice in A, does not affect water, height / volume ; 2 melting of, land-based ice / ice in B, increases water, height / volume ; 3 so (land-based ice melting) would cause flooding / increases sea levels / **AW** ; 4 leading to habitat loss / damage to coastal communities / **AW** ; 5 both will reduce water salinity / density ; 6 both affecting water circulation / currents ;	**3**

Question	Answer	Marks
3(c)(iii)	*any 2 of:* same volume / mass, of ice / frozen water ; repeat / **AW** ; use more narrow beaker to have bigger increases in height / smaller graduations on beakers / pour water into measuring cylinder / **AW** ; make sure temperature is controlled / regulated / **AW** ; leave longer (to ensure all ice melted) / leave until all ice melted / **AW** ;	**2**

Question	Answer	Marks
4(a)(i)	1 linear y axis that uses at least half grid ; 2 both axes labelled ; 3 points correct ; 4 points joined by straight lines ; 5 key for lines ;	**5**

Question	Answer	Marks
4(a)(ii)	*any 2 of:* same salinity ; same wave speed / currents ; same temperature ; same salinity ; same minerals / nutrients ; same pH ; same oxygen (concentration) ; same carbon dioxide (concentration) ; same depth ; same water clarity / turbidity / light intensity ; same area of coral sampled ;	**2**
4(b)(i)	*any 3 of:* 1 use of quadrat ; 2 grid area / **AW** ; 3 use of random numbers ; 4 count number of polyps (in each quadrat) ; 5 repeat / **AW** ;	**3**

Question	Answer	Marks
4(b)(ii)	144 – 102 = 42 ; 42 / 144 × 100 = 29 (%) ;	**2**
4(b)(iii)	*any 3 of:* 1 number of fish species (and polyp density) increased ; 2 coral contain zooxanthellae : 3 photosynthesise (by zooxanthellae / coral) / higher productivity / **AW** ; 4 so more, energy / biomass / food / **AW** ; 5 can sustain more trophic levels (of fish) / **AW** ; 6 more shelter for fish / breeding grounds / **AW** ; 7 more niches / **AW** ;	**3**
4(c)	spines / adapted dorsal fin / **AW** ; wedge into cracks so predators cannot get them / **AW** ;	**2**

Question	Answer	Marks
5(a)	*any 3 of:* for gas exchange ; (as cells need) oxygen ; for respiration ; to release energy ;	**3**

Question	Answer	Marks
5(b)	*any 6 of:* 1 sediment from lower shore and sediment from near pneumatophores / **AW** ; 2 use of random sampling / **AW** ; 3 same mass / volume, of sediment / weigh sample / **AW** ; 4 collect at same time / day / season / tide time / **AW** ; 5 same depth of sediment / **AW** ; 6 repeat / **AW** ; 7 warm gently / heat in oven **/ AW** ; 8 heat until mass no longer changes / **AW** ; 9 reweigh and calculate change in mass ; 10 calculate percentage water ; 11 appropriate safety precautions e.g. eye protection when heating / care on shore / clothing / **AW** ;	**6**

Question	Answer	Marks
6(a)(i)	Protoctist ;	**1**
6(a)(ii)	*any 4 of (mark in pairs):* large / flat, blades / blades have large surface area / **AW** ; for, (high) light absorption / carbon dioxide absorption ; chloroplasts / chlorophyll ; to absorb light / carbon dioxide ; gas bladders / **AW** ; to hold up to surface / floatation / **AW** ; stipe ; to link holdfast with blades (at surface) ;	**4**
6(b)(i)	fur / lactation / milk / give birth (to live offspring) ;	**1**
6(b)(ii)	(0.052 / 5.000) × 100 = 1.04 (%) ;	**1**

Question	Answer	Marks
6(b)(iii)	*any 3 of:* 1 not all organisms eaten / **AW** ; 2 respiration (by kelp / urchins); 3 movement (by kelp / urchins) ; 4 some, is indigestible / is not digested / released as faeces / is egested / **AW** ; 5 excretion (by kelp / urchins) ; 6 some, kelp / sea urchins, is harvested / some die / **AW** ;	**3**
6(b)(iv)	add iodine ; with starch it goes blue-black / without starch it stays brown / **AW** ;	**2**