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MARINE SCIENCE **9693/33**

Paper 3 A Level Theory Paper **October/November 2025**

MARK SCHEME

Maximum Mark: 75

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 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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 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	<u>'List rule' guidance</u> 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.

Annotations guidance for centres

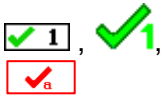
Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
	information missing or insufficient for credit
A	allow or accept
I	incorrect or insufficient point ignored while marking the rest of the response
CON	contradiction in response, mark not awarded
BOD	benefit of the doubt given
ECF	error carried forward applied
MR	maximum mark reached
PAG	point already given

Annotation	Meaning
	incorrect point or mark not awarded
	point has been noted, but no credit has been given or blank page seen
	marking point 1 or marking point a is awarded. Used to mark against a particular marking point from an extended answer MS
	used to highlight parts of an answer / incorrect idea / irrelevant to question
	used to highlight parts of an extended response / incorrect idea / irrelevant to question
	key point attempted / working towards marking point / incomplete answer / response seen but not credited / blank page seen
ruler	allows lengths to be measured
multi-line overlay	overlays graphs
Highlighted text	Highlighting areas of text
On-page comment box	Allows comments to be entered on the page
Off-page comment box	Allows comments to be entered at the bottom of the RM Assessor marking window and then displayed when the associated question item is navigated to

This mark scheme will use the following abbreviations:

;	separates marking points
/	alternative responses for the same marking point
R	reject the response
A	accept the response
I	ignore the response
ECF	error carried forward
AVP	any valid point / alternative valid point
ORA	or reverse argument
AW	alternative wording
underline	actual word given must be used by candidate (grammatical variants accepted)
( )	the word / phrase in brackets is not required but sets the context
MAX	indicates the maximum number of marks that can be given
+ **AND**	statements on both sides of the + or AND are needed for that mark
OR	separates two different routes to a mark point and only one should be awarded

Question	Answer	Marks
1(a)(i)	*type of life cycle:* complex ; *reasons:* larval stages present ; metamorphosis shown / polyp and medusa present ;	**3**
1(a)(ii)	*idea of* dispersal ;	**1**
1(b)	*any **four** of:* 1 fishermen get stung by jellyfish so, cannot fish / need treatment ; 2 reduced catch of fish (as nets fill with jellyfish) / jellyfish increase by-catch, so reducing, income / employment for fishermen ; 3 idea that large swarms, clog boat propeller / interfere with navigation, so preventing movement (of boat) ; 4 extra time spent on, cleaning nets / propeller instead of fishing reduces income ; 5 harvested fish, damaged / killed by stinging cells from jellyfish, so lower price obtained for fish ; 6 travel further / out from inlet, to fish (due to swarms), so more money spent on fuel / time wasted reaching shoal ; 7 decaying swarms use up oxygen in the water, so less available for fish ; 8 jellyfish prey on, cod eggs / juveniles or compete with cod for prey so, recruitment reduced / fewer cod survive to adulthood ;	**4**

Question	Answer	Marks
2(a)	*any **three** of:* 1 during inflow, the operculum is, closed / moves inwards ; 2 to prevent water flowing back across the gills ; 3 during outflow, the operculum is forced open / moves outwards ; 4 to allow water to pass out (from the gills) ; 5 correct *ref. to* pressure changes ;	**3**
2(b)(i)	*any **three** of:* 1 operculum movement shows the ventilation rate ; 2 oxygen concentration increases with decreasing temperature ; 3 so ventilation rate decreases ; 4 saves energy (needed for operculum movement / pumped ventilation) ; 5 more energy available for, swimming / hunting prey ;	**3**
2(b)(ii)	*any **two** of:* 1 larger ball (in stomach) will have a smaller surface area (to volume ratio) ; 2 enzymes will not be able to reach centre of ball ; 3 so digestion will, be incomplete / take longer ; 4 idea of energy diverted (from swimming/ hunting) to digest food ; 5 **AVP** ;	**2**

Question	Answer	Marks
2(b)(iii)	*any **three** of:* 1 faster digestion of food in warm water ; 2 will result in, faster food absorption / increased growth ; 3 higher oxygen concentrations not required ; 4 as fish not hunting for food / fish resting ;	**3**

Question	Answer	Marks
3(a)(i)	numbers are low / distribution range is small, so population at risk of extinction **;**	**1**
3(a)(ii)	*any **three** of:* conservationists would want to restrict: 1 access to the island tourism, as it would disturb bird breeding grounds ; 2 (fishing / tourist) boats, as they would, disturb / cause migration of, the Atlantic goliath grouper / Guiana dolphin ; 3 fishing, which would, increase food for seabirds **OR** decrease catch / food / income / employment, for locals ; 4 fishing, to avoid reducing numbers of Atlantic goliath grouper / Guiana dolphin 5 tourism, so less, employment opportunities / income, for locals ;	**3**

Question	Answer	Marks
3(a)(iii)	*any **four** of:* 1 catch restrictions on commercial fishing, to retain enough fish for recruitment ; 2 fishing restrictions on, location / season, to avoid breeding season of, fish / grouper / dolphin ; 3 suitable fishing methods / no bottom-trawling / dredging, to avoid by-catch / no disturbance to seabed habitat ; 4 restricted visits by tourists, to avoid bird, breeding / nesting season ; 5 site managed locally / locals involved in decision making / regular meetings with locals, so conflicts less likely / locals can see the benefits ; 6 idea of, raises awareness / educating, schoolchildren / tourists, on conservation issues ; 7 regular monitoring of MPA / enforcement of restrictions ; 8 **AVP** ;	**4**
3(a)(iv)	*any **two** of:* 1 these species might be prioritised over others ; 2 population of these (two) species increases ; 3 so there will be less prey (for other species) ; 4 *idea of* disrupts food chains / webs / ecosystems ;	**2**
3(b)(i)	*idea of* sustainable tourism associated with an appreciation of the environment / tourism that causes minimal damage to the environment / tourism that can benefit the environment and local population ;	**1**
3(b)(ii)	1 raises awareness / educates tourists about conservation ; 2 tourism brings in money for conservation measures ;	**2**

Question	Answer	Marks
4(a)(i)	**A** – thylakoid / thylakoid membrane / lamella ; **B** – granum **C** – stroma **D** – chloroplast / inner, membrane ;	**3**
4(a)(ii)	C ;	**1**
4(a)(iii)	starch ;	**1**
4(b)(i)	increasing hydrogen ion concentration (in water) ; makes the pH more acidic / lowers the pH ;	**2**
4(b)(ii)	1 *colour* – purple ; *any **two** of:* 2 pH increases / becomes less acidic ; 3 as carbon dioxide used up for photosynthesis ; 4 any carbon dioxide from respiration was used in photosynthesis ; 5 rate of photosynthesis was greater than the rate of respiration ;	**3**
4(b)(iii)	*any **three** of:* 1 no photosynthesis as light prevented from reaching tube ; 2 indicator would change colour to yellow ; 3 as carbon dioxide was produced from respiration ; 4 which produced hydrogen ions ; 5 so decreasing the pH ;	**3**

Question	Answer	Marks
5	*any **ten** of:* 1 availability of stock ; 2 by keeping broodstock to provide a source of young / by collection of juveniles from the wild / by buying in fertilised eggs / juveniles ; 3 availability of clean water ; 4 by, natural water exchange /tides / currents, in an extensive system ; 5 by using a filtration system (in intensive systems) ; 6 availability of feed / regular food supply ; 7 natural food in some extensive systems / feed supplied in intensive systems ; 8 *ref. to* fishmeal as being unsustainable **OR** new food sources e.g. insects / soya ; 9 efficiency of use of feed ; 10 to ensure optimum growth / achieve suitable feed conversion ratios ; 11 *ref. to* pollution problems when excess feed is wasted ; 12 availability of labour ; 13 especially for intensive systems **OR** when harvesting ; 14 disease management ; 15 *ref. to* overstocking / grading fish in intensive systems ; 16 *use of*, antibiotics / vaccines (to reduce / treat, disease) **OR** correct *ref. to* using UV light / disinfectant ;	**10**

Question	Answer	Marks
5	17 availability / suitability, of location ; 18 *ref. to* monitoring / controlling abiotic conditions ; 19 prevent, predators / parasites, from entering / fish escaping ; 20 must have good, transport links / storage facilities ;	

Question	Answer	Marks
6(a)	*any **six** of:* *smooth ER:* 1 flattened / membrane bound, sacs / cisternae ; 2 which can be interconnected ; 3 no ribosomes attached ; 4 makes lipids / steroids / steroid hormones ; 5 suitable example e.g. cholesterol / oestrogen / testosterone ; 6 AVP ; *Golgi body:* 7 stack of flattened / membrane bound, sacs / cisternae **AND** vesicles ; 8 (vesicles) from ER ; 9 collects / processes / modifies, molecules ; 10 e.g. proteins ; 11 makes cell wall components in plants ; 12 makes lysosomes ;	**6**

Question	Answer	Marks
6(b)	*any **five** of:* 1 respiration is a process used to release energy ; 2 from organic molecules / organic nutrients ; 3 produce ATP / produce energy in the form of ATP ; 4 aerobic respiration requires oxygen **AND** anaerobic respiration occurs in the absence of oxygen ; 5 aerobic respiration represented by $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$; 6 aerobic respiration takes place in mitochondria and cytoplasm / anaerobic respiration occurs in the cytoplasm ; 7 anaerobic respiration yields far less ATP (per molecule of glucose) than aerobic respiration ; 8 AVP ;	**5**

Question	Answer	Marks
7	*any **nine** of:* 1 inflow will suck in plankton / zooplankton / fish eggs / larvae ; 2 so reducing recruitment / less food for consumers ; 3 outflow will increase the concentration of dissolved salts / increase salinity, in sea water ; 4 can change depth of halocline ; 5 increased water loss from marine organisms (due to higher salinity / lower water potential of sea water) ; 6 (water loss) by osmosis ; 7 (increased salinity) affects osmoconformers / stenohaline organisms ; 8 makes (immediate) habitat unsuitable for many marine organisms / reduces biodiversity ; 9 can stir up sediment ; 10 which blocks gills of, fish / invertebrates / filter feeders, **OR** covers coral causing bleaching ; 11 sea water more turbid ; 12 prey not easily seen ; 13 blocks / less light for producers ; 14 reduced photosynthesis / (primary) productivity ; 15 effect of, hot water / toxins / chemicals, released on organisms ; 16 (increased salinity) reduces oxygen concentration in sea water ; 17 causing suffocation / less available for (aerobic) respiration ;	**9**