CAMBRIDGE
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MARINE SCIENCE **0697/22**

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)	A: continental slope ; B: abyssal plain ; C: (mid-)ocean ridge ;	**3**
1(a)(ii)	*any **3** of:* ref. to Pangaea / supercontinent / **AW** ; plates float on magma / mantle / **AW** ; convection currents move plates ; continents / land masses, broke away (from supercontinent / Pangaea) / move apart / **AW** ; takes (hundreds of) millions of years ;	**3**
1(b)(i)	0.6 ;;	**2**
1(b)(ii)	*any **4** of:* attach rope to (weighted) floating object / **AW** ; releasing floating object into water / **AW** ; measure time taken (to move distance) / **AW** ; measure length of rope / measure distance (object has moved) / **AW** ; calculate speed as distance ÷ time ; repeat / **AW** ;	**4**

Question	Answer	Marks
1(b)(iii)	(yes because) current speeds are, similar (for all times) / very close / almost same / **AW** ; *and any **2** of:* only three points times done / not enough repeats / low sample size / times are spread out / **AW** ; no data for night / **AW** ; one of the readings (for the late afternoon) may be anomalous / wide variation of speeds (at 18:00) ; weather / wind / tides / storms, may affect (current speed) / **AW** ;	**3**

Question	Answer	Marks
2(a)	*any **3** of:* release net into sea / release net from boat / **AW** ; boat circles round (so net surrounds) fish / surround the fish with the net / **AW** ; drawstring / ropes, pulled to, close net / close bottom of net / **AW** ; ref. to net (with catch) pulled on board boat ;	**3**
2(b)(i)	large drawing ; neat, clear lines that are not broken lines and no shading ; (proportions of all correct) width of tail is more than width of body ; operculum, pectoral fin, caudal fin, eye, and mouth present in correct locations ;	**4**
2(b)(ii)	name: caudal (fin) ; function: thrust / move fish forward / drives it forward / **AW** ;	**2**
2(b)(iii)	16 (cm) ;; **OR** correct measure of length of line X ; division of length by 0.85 ;	**2**
2(b)(iv)	domain (Eukarya) + (kingdom) animals (genus) *Scomber* + (species) *scombrus*	**2**

Question	Answer	Marks
2(c)(i)	*any **2** of:* light / sunlight ; high oxygen (concentration) / **AW** ; low pressure ; variation in temperature / variable temperature / **AW** ;	**2**
2(c)(ii)	*Any **2** of:* counter-shading / camouflage / **AW** ; escape from predators / catch prey / **AW** ; **OR** fast swimmers / streamlined / **AW** ; escape from predators (as there is no shelter) / catch prey ; **OR** generalist feeding / can eat many different types of food / **AW** ; due to competition / availability of food / **AW** ; **OR** migratory ; to reach breeding / feeding grounds / **AW** ;	**2**

Question	Answer	Marks
3(a)	X: subtidal (zone), Y: intertidal (zone), Z: supratidal (zone) ;	**1**

Question	Answer	Marks
3(b)(i)	*any **3** of:* lay out a transect / **AW** ; reference to use of a quadrat ; place (quadrat) at (regular) intervals ; count number (of limpets in) (each quadrat) ;	**3**
3(b)(ii)	idea of it is not easy to see, individual organisms / not distinct organisms / **AW** ;	**1**
3(b)(iii)	*any **4** of:* limpets are high near low tide level / **AW / ORA ;** as less likely to dry out (lower down shore) / have more access to water / are less exposed to sunlight / air / wind / more time covered by water / **ORA** / **AW** ; limpets shelter under *Fucus* sp. / seaweed / **AW** ; warmer / higher temperature / more stable, conditions lower down shore / **AW** / **ORA** ; limpets eat *Fucus* sp. / seaweed / **AW** ; less predation when lower down shore / **AW** ; limpets are not dislodged by tides / waves (so can live in lower areas of shore) / **AW** ;	**4**

Question	Answer	Marks
3(c)	*any **3** of:* live in rock pools / crevices / overhangs / shaded sides of outcrops / **AW** ; live under seaweed / macroalgae ; retract tentacles / close up / **AW** ; avoid drying out / prevent water loss / **AW** ; attach to rocks / substrate / stick to rocks / **AW** ; so not dislodged by tides / waves / **AW** ;	**3**

Question	Answer	Marks
4(a)(i)	correct multiplication of population by plastic per person (52 418 040) ; correct conversion to tonnes and to nearest whole number (52 418) ;	**2**
4(a)(ii)	linear scale for *y* axis that uses at least half axis ; labels and units (for *y*-axis) ; bars plotted ; all bars drawn with straight lines, equal widths and gaps ;	**4**
4(a)(iii)	fewer recycling programmes / more use of plastic / more industry / lack of education (about plastic risks) / less access to waste disposal / **AW / ORA** ;	**1**
4(b)(i)	carbon dioxide + water → glucose (+ oxygen) ;	**1**

Question	Answer	Marks
4(b)(ii)	*Any **pair** of:* temperature ; water bath / heat shield / Perspex shield / **AW** ; **OR** carbon dioxide ; add hydrogen carbonate / (sodium) bicarbonate / **AW** ; **OR** light colour / light intensity ; use same bulb / same light filter / same distance from lamp / **AW** ; **OR** pH ; use buffer ;	**2**
4(b)(iii)	table with all headings and data enclosed in a box ; headings as ‘(number of) sheets of plastic’ and ‘(number of) bubbles released in 10 minutes’ ; readings all recorded in order with correct pairing of data only numbers ;	**3**
4(b)(iv)	*any **2** of:* plastic blocks light / reduces light intensity / **AW** ; so (more plastic) reduces photosynthesis / **AW** ; so less energy is transferred into ecosystems / less food for consumers / less energy passes along food chains / damages food chains / **AW** ;	**2**

Question	Answer	Marks
4(b)(v)	use a syringe / measuring cylinder ; to collect volume (of oxygen) ;	2

Question	Answer	Marks
5(a)(i)	calcium / vitamin D ;	1
5(a)(ii)	(iron is needed to make) haemoglobin ; to transport oxygen ;	2

Question	Answer	Marks
5(b)	*any **6** of:* use aquaculture fish and wild fish / use both types of fish / **AW** ; use of boiling tube with water / **AW** ; same volume of water in tube / stated volume / **AW** ; use same mass / volume of fish tissue / weigh fish before / **AW** ; same age / sex / same part, of fish / **AW** ; dry fish / **AW** ; set fire to / burn fish / **AW** ; heat water / tube with burning fish / place burning fish under tube / **AW** ; measure change in temperature of water / temperature before and after / **AW** ; appropriate safety precautions e.g. eye protection / **AW** ; repeats (for reliability) ;	**6**

Question	Answer	Marks
6(a)(i)	<u>concentration</u> of (dissolved) salt (in water) / solutes ; parts per thousand / ppt / % ;	**2**
6(a)(ii)	1.8 ;;	**2**

Question	Answer	Marks
6(b)	*any **4** of:* Arctic water / it has lower temperature (than equatorial water) / **ORA** / **AW** ; so lower salinity in Arctic water / **ORA** / **AW** ; lower evaporation of Arctic water / **ORA** / **AW** ; melted ice / melted glacier runs into (Arctic water) (reducing salinity) / **ORA** / **AW** ; high(er) oxygen, in cold water / low salinity water / fresh water / **ORA** / **AW** ; ref to photosynthesis / respiration affecting oxygen ;	**4**
6(c)	add universal indicator / use universal indicator strips ; comparison of two correct colours linked with pH / compare colours to scale on indicator chart ; **OR** pH meter / data logger ; read value for fresh water and for seawater / **AW** ;	**2**