



Cambridge O Level

MARINE SCIENCE

5180/03

Paper 3 Practical Assessment Paper

October/November 2022

MARK SCHEME

Maximum Mark: 60

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 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **11** printed pages.

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 descriptors 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.

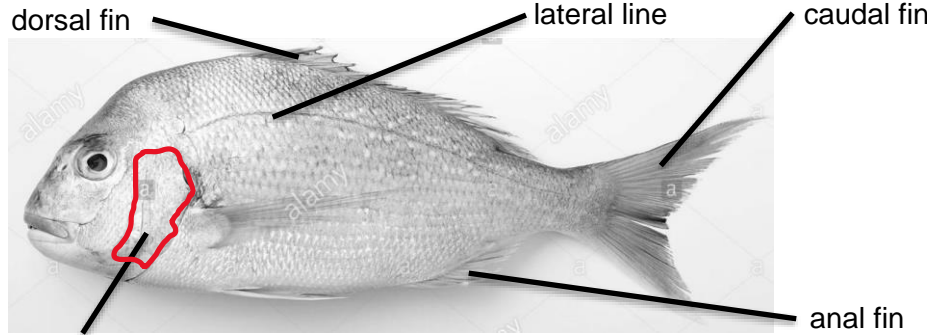
7 Guidance for chemical equations

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.

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
<u>underline</u>	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)	appropriate size (min. same size as photo) ; outline correct shape (eye shown, fins, size of caudal fin); neat lines ; features showing mouth and lateral line in correct position ;	4
1(a)(ii)	line touching the correct features  <p>dorsal fin lateral line caudal fin anal fin operculum</p>	3
1(b)(i)	scale line drawn in showing total length ; labelled as 36.2 + cm ;	2
1(b)(ii)	range 14.3–14.5 (cm)	1
1(b)(iii)	answer from (b)(ii) / 36.2 ;	2

Question	Answer	Marks
2(a)(i)	mollusc ;	1
2(a)(ii)	organism A ... cephalopod ; organism B ... gastropod ;	2

Question	Answer			Marks																		
2(b)	<table border="1"> <thead> <tr> <th data-bbox="333 213 725 279">feature</th> <th data-bbox="725 213 943 279">organism A</th> <th data-bbox="943 213 1160 279">organism B</th> </tr> </thead> <tbody> <tr> <td data-bbox="333 279 725 344">external shell</td> <td data-bbox="725 279 943 344">X</td> <td data-bbox="943 279 1160 344">✓</td> </tr> <tr> <td data-bbox="333 344 725 410">eyes</td> <td data-bbox="725 344 943 410">✓</td> <td data-bbox="943 344 1160 410">✓</td> </tr> <tr> <td data-bbox="333 410 725 475">foot</td> <td data-bbox="725 410 943 475">X</td> <td data-bbox="943 410 1160 475">✓</td> </tr> <tr> <td data-bbox="333 475 725 541">suckers</td> <td data-bbox="725 475 943 541">✓</td> <td data-bbox="943 475 1160 541">X</td> </tr> <tr> <td data-bbox="333 541 725 606">antennae present on head</td> <td data-bbox="725 541 943 606">X</td> <td data-bbox="943 541 1160 606">✓</td> </tr> </tbody> </table>	feature	organism A	organism B	external shell	X	✓	eyes	✓	✓	foot	X	✓	suckers	✓	X	antennae present on head	X	✓			5
feature	organism A	organism B																				
external shell	X	✓																				
eyes	✓	✓																				
foot	X	✓																				
suckers	✓	X																				
antennae present on head	X	✓																				

Question	Answer	Marks
3(a)	<p><i>Any 5 from:</i> collect (stated), volume / mass, of sample / sediment ; from different areas (of the shore) ; either: place into large measuring cylinder ; add water (to set level) ; shake vigorously ; leave / allow to settle ; measure depth / volume of each type of substrate ; OR dry sand (before) ; (placing sample in) sieving machine / stack of sieves / sieve through different sizes of mesh ; (by) shaking sieve (vigorously) / vibrating (machine) ; find mass of particles that go through each sieve ; use micrometer to measure particles / graticule under microscope to measure particles ; stated number of particles (min.100) ; draw histogram to show distribution (to compare) ;</p>	5

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Question	Answer	Marks
3(b)	calculate mass ÷ volume ; <i>Plus any 4 from:</i> Collect (stated number) of shells from two different locations ; find the mass of all the shells using a balance ; add shells to partially filled measuring cylinder / displacement can / eureka can ; note / record displacement volume / subtract initial volume from final volume / collect and measure volume of water displaced ; repeat for each shell / ref. to total mass and total volume i.e. all measured at the same time / find the mean by adding together and dividing by number of shells ; calculate density in g / cm ³ ; ref. to breaking shells to remove air ;	5

Question	Answer			Marks															
4(a)	<table border="1" data-bbox="338 715 1449 1043"> <thead> <tr> <th data-bbox="338 715 539 780">species</th> <th data-bbox="539 715 992 780">(number of) organism in Area P</th> <th data-bbox="992 715 1449 780">(number of) organism in Area Q</th> </tr> </thead> <tbody> <tr> <td data-bbox="338 780 539 845">barnacles</td> <td data-bbox="539 780 992 845">98</td> <td data-bbox="992 780 1449 845">34</td> </tr> <tr> <td data-bbox="338 845 539 911">green algae</td> <td data-bbox="539 845 992 911">15</td> <td data-bbox="992 845 1449 911">7</td> </tr> <tr> <td data-bbox="338 911 539 976">limpets</td> <td data-bbox="539 911 992 976">24</td> <td data-bbox="992 911 1449 976">9</td> </tr> <tr> <td data-bbox="338 976 539 1043">shore crabs</td> <td data-bbox="539 976 992 1043">5</td> <td data-bbox="992 976 1449 1043">2</td> </tr> </tbody> </table> <p data-bbox="338 1082 831 1214"> table with recognisable, aligned cells ; headings correct ; 3, columns / rows, in a single table ; correctly linked data in a single table ; </p>			species	(number of) organism in Area P	(number of) organism in Area Q	barnacles	98	34	green algae	15	7	limpets	24	9	shore crabs	5	2	4
species	(number of) organism in Area P	(number of) organism in Area Q																	
barnacles	98	34																	
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Question	Answer	Marks
4(b)	axes labelled ; suitable scale to cover at least half the graph paper on both axes ; plotting – bars correct height ; bars not touching ; key for / clearly identified between, Area P and Area Q ;	5
4(c)	<i>Any 2 from:</i> same number of species in both areas ; fewer of all species in Area Q ; area Q has a lower biodiversity than area P / ORA ;	2

Question	Answer	Marks
5(a)	<p><i>Any 14 from:</i> transect line / belt ; sample every 2 metres (or acceptable suggestion) / AW ;</p> <p><i>Mussel measurement</i> using quadrat ; of stated suitable size between 10 cm and 30 cm ; measure length of mussels (with ruler) ; reasonable suggested number to measure (min. 5 from each area) ;</p> <p><i>current measurement</i> bottle half filled with sand / equivalent floating device ; attached to stated length of string ; use timing device / AW ; time it takes for string to unravel / AW ; speed = distance / time ; repeat 3 times ; repeat at different areas of the mussel bed ;</p> <p>safety – any sensible one e.g. wear suitable shoes, go with another person, wear lifejacket / buoyancy aid ; OR lab based method MP's 5, 12 and results marks plus: reasonable suggested number (min. 5 in each setup) ;</p> <p>same, mass / volume / age / species ;</p> <p>control variable (water temp., pH, food added) ;</p> <p>pump to create current ;</p> <p>leave for stated time period ;</p> <p>remeasure length ;</p> <p>(safety) ensure pump wire is intact ;</p>	14

Question	Answer	Marks
5(a)	record in a table ; suitable headings + units ; columns for repeats ; column for mean / reference to calculating the mean ; draw scatter graph / plot (mean) current speed against (mean) mussel length ; named axes ; refer back to hypothesis ;	
5(b)	<p><i>Any 3 from:</i> other abiotic / biotic factors may cause this ; may be different species of mussels present ; named e.g. time exposed to air / water temperature / competition / light intensity / depth / sediment / predators / nutrients ;; weather / wind direction (may affect current results) ; correct reference to anomalous results ; (if repeats not mentioned in method) test several times ; and find mean ;</p> <p><i>Plus any 3 from:</i> test at different times of the year / seasons ; measure other named abiotic factors ; test at many different shores ; test at different shore types (e.g. rocky, sandy, muddy) / substrates ; test for different species of mussel / mollusc ; measure factors other than length ; current speed varies with state of the tide / phase of the moon, so need to test different times of the day / days of the month ; AVP ;</p>	5