Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

MARINE SCIENCE **5180/01**

Paper 1 Structured **October/November 2019**

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 2019 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 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.

Question	Answer	Marks	Guidance
1(a)(i)	photosynthesis ;	**1**	
1(a)(ii)	(organism that) eats only plants / vegetation / phytoplankton / algae / producers ;	**1**	
1(a)(iii)	*Max 2 for just nitrates OR phosphates* nitrates provide nitrogen **OR** phosphates provide phosphorous ; (nitrates) needed for, amino acids / protein / nucleic acids ; amino acids used to make protein ; (phosphates) used, to make, DNA / RNA / nucleic acids / ATP / phospholipids / for cell division ; use for any of the products in MP4 ;	**3**	**A** any valid use e.g. phospholipids for membranes, ATP for energy
1(b)(i)	(25.2 – 1.8 =) 23.4 ;	**1**	
1(b)(ii)	1300 ; ;	**2**	**A ECF** from **(i)** 1 mark for evidence of correct working $\frac{23.4}{1.8} \times 100$
1(b)(iii)	increase ; (more) food / habitat / shelter, available ;	**2**	 **A** description of **I** ref. to nesting

Question	Answer	Marks	Guidance
2(a)(i)	beam trawl ; pole-and-line ;	**2**	**I** trawling alone or other trawling methods **I** pole
2(a)(ii)	*any 3 from:* damage to, sea bed / benthic organisms / organisms living at the bottom ; *idea of*, indiscriminate / by-catch / non-target species ; capture of, under-sized / juvenile (fish / organisms) ; *idea of*, (catching juveniles) reduces future population ; *idea of*, by-catch / juveniles, not usable / thrown back dead / thrown back a long way from original habitat ; *idea of*, less / little / no, control over catch size ;	**3**	assume talking about beam trawl unless clearly stated otherwise **A** more likely to overfish / overexploit

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2(b)</td><td>
<table>
<tr><th>Aid ; ;</th><th>How it aids navigation ; ;</th></tr>
<tr><td>GPS / satellites</td><td>know location</td></tr>
<tr><td>radio</td><td>know location</td></tr>
<tr><td>radar</td><td>avoid, collision / obstacles
navigate a course (into port)
know location</td></tr>
<tr><td>ships lights OR light boats OR lighthouses</td><td>avoid, collision / obstacles
navigate a course (into port)
know location</td></tr>
<tr><td>foghorns</td><td>avoid, collision / obstacles</td></tr>
<tr><td>bouys / cardinal marks</td><td>avoid, collision / obstacles
navigate a course (into port)
know location</td></tr>
<tr><td>compass</td><td>follow course
know direction of travel</td></tr>
<tr><td>charts / maps</td><td>plot course
know location
identify or avoid dangers / avoid, collision / obstacles
know depth</td></tr>
<tr><td>echo sounder / sonar</td><td>know depth</td></tr>
<tr><td>stars / star charts / Sun</td><td>know location
direction of travel</td></tr>
</table>
</td><td>4</td><td>2 Aids plus 2 appropriate descriptions

I avoid accidents for collisions</td></tr>
</table>

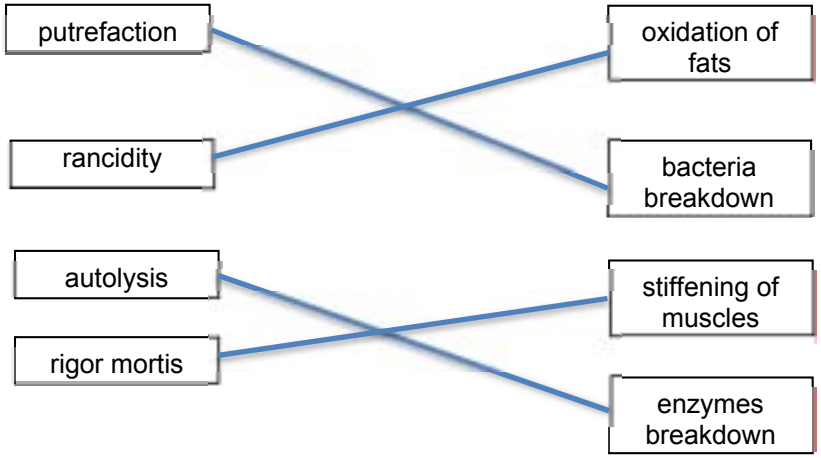
Question	Answer	Marks	Guidance
3(a)(i)	(habitat 1) mangrove ; (habitat 2) rocky shore ; *PLUS any 2 from (for mangrove)* brackish / changing salinity **AW** ; little wave action ; large temperature variation ; sedimentation / low erosion ; *idea of*, soft substrate / silty / muddy ; shallow water ; low tidal range ; *PLUS any 2 from (for rocky shore)* high wave action / high energy / lots of waves ; *idea of*, exposed (rather than sheltered) ; high erosion / low sedimentation ; hard / stable, substrate ; large temperature variation ; regular drying of the shore ; presence of (lots of) rock pools ;	**6**	**I** rocky for hard
3(a)(ii)	*benefit* ; income / employment / protect wild stock / (predictable) food supply / increased or predictable yield *negative impact* ; loss of biodiversity loss of nursery areas for fish loss of habitat reduction of fish species for fishermen build-up of chemicals used in aquaculture eutrophication increased spread of disease (in shrimp)	**2**	1 benefit and 1 impact **I** pollution unqualified

Question	Answer	Marks	Guidance
3(b)	*any 3 from:* (in the lagoon) high(er) temperature ; high(er) salinity ; high(er) density ; low(er) oxygen ; low(er) nutrients ; shallow(er) ; low(er) wave action ;	**3**	**A** still / calm, water

Question	Answers	Marks	Guidance
4(a)(i)	K ; J ;	**2**	**A** indicated on graph
4(a)(ii)	will decrease ; *plus any 1 of:* due to too many fish being taken fewer fish reach maturity less breeding ;	**2**	**A** (over) exploitation / MSY exceeded **A** lower recruitment
4(a)(iii)	*any 2 from :* previous (year) fishing effort ; recruitment / birth rate / fecundity ; disease in the fish ; temperature change / global warming / climate change / El Niño / La Niña / ENSO ; effect of prey / food / predator, numbers ;	**2**	**I** over / under fishing unqualified **A** rate of reproduction **I** population increases / decreases unqualified

Question	Answer	Marks	Guidance
4(b)	*any 2 from :* boats licences / number of boats ; restrict fishing days / fishing seasons ; restrict mesh / trap size ; quotas / bans on certain species ; restrictions on gear / type of fishing ; restriction on fishing location / no take zones / MPAs ; patrols / checking / inspection ; fines / punishments ;	**2**	**I** laws unqualified **R** if change would negatively impact on juveniles

Question	Answer	Marks	Guidance
5(a)	27.0 ;	**1**	**A** 27
5(b)	(export quantity) decrease ; (earnings) increased ;	**2**	**I** refs. trends 2010–2011 **ECF 5(a)** **I** comparison of 2007 and 2010 only
5(c)	*any 2 from:* high(er) price (on market) ; high(er) demand ; low(er) supply / selling less / less fish is exported (than in 2007/8) ; high(er) supply / selling more / more is exported (than in 2010) ; change in exchange rate / value of MRF ; high(er) quality ; tariff on fish ;	**2**	

Question	Answer	Marks	Guidance
6(a)		**3**	All 4 correct = 3 marks 2 or 3 correct = 2 mark 1 correct = 1 marks **R** more than one line from any one type of spoilage
6(b)	*any 3 from:* handle fish with care / place fish belly up ; wash / clean (hands / fish / water) ; removal of guts ; cool (fish needs to be chilled / iced / covered with wet net) ; (cooled or transported to processing vessel / plant) quickly ; store live ;	**3**	**I** put in bait hold unqualified **A** ref. to temperatures ⩽ 5 °C
6(c)	*any 3 from:* gamma (radiation) ; (named source) Cobalt 60 / Caesium 137 ; X-rays ; (irradiation) sterilises / kills the, bacteria / fungi ; radapperisation / radication / radurisation ;	**3**	**R** gamma x-rays **I** kills germs / pathogens / viruses

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7</td><td>
<table>
<tr><th>feature</th><th>name</th><th>main function</th></tr>
<tr><td>A</td><td>operculum ;</td><td>covers / protects, gills OR aids in, water flow / ventilation, over gills ;</td></tr>
<tr><td>B</td><td>caudal / tail fin ;</td><td>(Forward) movement / propulsion / thrust ;</td></tr>
<tr><td>C</td><td>lateral line ;</td><td>detects, water movement / pressure (changes) / vibrations ;</td></tr>
</table>
</td><td>6</td><td></td></tr>
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Question	Answer	Marks	Guidance
8(a)	*any 3 from:* provides shelter (from winds / storms) ; boat building ; boat repair / maintenance ; chandlery / boat equipment shops ; fishing gear repair / manufacture ; (deep water / space for) landing / mooring / (un)loading / launching / hauling (for boats) ; presence of (named) navigational aids ; handling / processing ; good transport links ; fish market ; utilities ; OR *up to 2 of* water / fuel / sewage / oxygen tanks / ice / food / **AVP** ; ;	3	**A** protection **A** boat storage **A** boatyard if neither MP2 or 3 stated **A** jetties / pontoons **A** place to store fish e.g. gas refills

Question	Answer	Marks	Guidance
8(b)(i)	*any 2 from:* increases income ; diversification of income ; provides employment during closed fishing season / supplement fishing work ; *idea of*, increased demand for fish ; use boats / dhonies for transporting tourists ; conservation through tourism leads to more fish to catch ;	**2**	**A** brings in foreign currency
8(b)(ii)	*any 3 from:* loss of area for fishing **OR** reduction in area for tourists ; activities / presence of, tourists / divers, means less fish for fishermen ; (fishermen / tourist activities) may cause damage to habitat / reef ; implication of this damage (for tourists or fishermen) ; (commercial) fishing reduces number of fish for tourists / divers / game fishermen ; change of role from fishing to working in tourism ; ref. to landing areas may be smelly / unattractive ; tourists / divers becoming entangled in fishing gear ;	**3**	e.g. less attractive reef to see / less nursery grounds for commercial stocks
8(c)(i)	*any 2 from:* sustainability / low impact actions ; education ; *idea of,* involvement of local population (in scheme / activities) ; *idea of*, involvement of tourists in conservation activities ;	**2**	
8(c)(ii)	Marine Protected Areas / MPAs ;	**1**	**A** no-take zone / exclusion zone

Question	Answer	Marks	Guidance
9(a)	*any 3 from:* external ; (fertilisation is the) fusion / joining, of ; egg / ovum **+** sperm ; additional detail ;	**3**	**MAX 2** if discussing asexual **I** *idea of*, meeting- needs to imply fusion **A** female and male gametes e.g. spermatophore / sperm packet / female moults (beforehand)
9(b)(i)	*any 2 from:* kept in an enclosure / tank / cage ; where, environment / water quality / water flow / temperature / oxygen / salinity / pH, is controlled ; feeding controlled ; use of antibiotics / medication ; high density / description of ;	**2**	**I** predators are excluded **A** abiotic factors are controlled **A** food is added / they are fed
9(b)(ii)	*any 2 from:* temperature ; light ; pH ; oxygen ; salinity ; wave action ; current ; substrate / **AW** ;	**2**	
9(b)(iii)	*any 2 from:* *idea of*, more likely to survive (at this size) ; fewer predators for them at this size / can defend against predators ; more able to find food ; would need large(r) areas (to grow further) ; not cost effective / expensive (to grow to larger size) ;	**2**	**I** lobsters are fully formed (by 12 weeks)
9(c)	to sustain the stocks / conserve population / prevent overfishing ; to allow them to reproduce (before being caught) ;	**2**	**A** so population wouldn't become extinct