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**MARINE SCIENCE**

**5180/02**

Paper 2

**October/November 2019**

MARK SCHEME

Maximum Mark: 60

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**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.

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This document consists of **9** printed pages.

**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)	(blue) crab ;	<b>1</b>	
1(a)(ii)	highest: 26 g ; lowest: 17 g ;	<b>2</b>	
1(a)(iii)	24 / 84 ; · 1000 ; 300 / 290 / 286 / 285.7 ;	<b>3</b>	
1(a)(iv)	2 · 0.9 <b>OR</b> 0.9 / 50 ; 0.018 ;	<b>2</b>	
1(a)(v)	<i>any 1 of:</i> water ; (dietary) fibre ;	<b>1</b>	
1(b)	salmon has the high(est), lipid / fat, content ; lipids, store / provide, energy ; <b>OR</b> other fish must contain, compounds / water / <b>AW</b> , with less energy content ;	<b>2</b>	I has lipid
1(c)	<i>any 4 of:</i> (death and) sinking <b>OR</b> on sea bed ; decomposition / decomposer / decay ; (by) bacteria / fungi ; ref. <u>nitrates</u> ; upwellings / description of ;	<b>4</b>	I break down unqualified

Question	Answer	Marks	Guidance
2(a)(i)	1970 ;	1	
2(a)(ii)	2 ;	1	
2(b)(i)	<p><i>any 3 of:</i></p> <ol style="list-style-type: none"> <li>1. warming of sea <u>surface</u> in (central / eastern) Pacific Ocean / around (west coast) S America <b>OR</b> warm air rising in Pacific Ocean ;</li> <li>2. lower trade winds / less East to West wind / wind reverses becoming West to East / weaker 'Easterly' winds ;</li> <li>3. water current reverses (to West to East) ;</li> <li>4. reduced rainfall over Indonesia / Australia ;</li> <li>5. rainfall / cyclone / storms, increase over tropical Pacific / east central / east Pacific / (west coast of) South America ;</li> <li>6. reduced upwelling ;</li> </ol>	3	

Question	Answer	Marks	Guidance
2(b)(ii)	reduction / <b>AW</b> ;	<b>1</b>	
2(b)(iii)	<i>any 3 of:</i> 1. reduced upwelling ; 2. reduced primary productivity ; 3. reduces food / energy (for primary consumers) ; 4. alters breeding / reproduction ; 5. migration of anchovies / sweeps anchovies out to sea ; 6. poorer conditions for fishing due to weather ; 7. (more / new) predators ;	<b>3</b>	<b>A</b> reduced productivity / fewer producers / less photosynthesis
2(c)(i)	increase and then decrease ; peak at 1986 ;	<b>2</b>	
2(c)(ii)	<i>any 4 of:</i> 1. less anchovies so fishers are taking (more) pilchards / <b>ORA</b> ; 2. competition with anchovies ; 3. fishing effort ; 4. demand for pilchards / price for pilchards (means more fishing effort) ; 5. predation ; 6. migration / pilchards moved (by currents) ; 7. food availability ; 8. adaptation to temperature ;	<b>4</b>	

Question	Answer	Marks	Guidance
3(a)(i)	(animals / organisms), that catch / hunt / kill (other animals) ; (and) eat animals / are carnivores / prey on other consumers / eat prey ;	2	<b>R</b> in context of plants <b>I</b> organisms
3(a)(ii)	<i>any 3 of:</i> 1. <i>idea of</i> , both organisms benefitting ; 2. protection from predators ; 3. streamlining / reducing drag / hydrodynamic efficiency / less energy lost swimming ; 4. improved hunting / easier to catch food / <b>AW</b> ; 5. (they are able to shoal together because) they occupy different niches / there is little competition ;	3	<b>I</b> symbiotic unless explained <b>I</b> reproductive advantages
3(b)	class ; <i>Thunnus + albacares</i> ;	2	<i>Thunnus</i> for genus (must be capital) <i>albacares</i> for species (must be lower case)
3(c)	<i>any 8 of:</i> 1. (bony) skeleton ; 2. for muscle attachment / for support / protection ; 3. gills ; 4. (with large surface area) for gas exchange / <b>AW</b> / for osmoregulation ; 5. heart ; 6. to pump blood ; 7. swim bladder ; 8. (to hold air) for buoyancy / <b>AW</b> ; 9. gonads ; 10. for gamete production / <b>AW</b> ; 11. gut / intestine(s) / stomach ; 12. for digestion / <b>AW OR</b> absorb food ; a) other named organ ; b) other appropriate function ;	8	<b>MAX</b> 5 for parts alone

Question	Answer	Marks	Guidance
4(a)	<p><i>any 2 of:</i>            continued / maintained, employment ;            increased earnings ;            protection of fisheries resources / description of <b>OR</b> maintaining a food source for humans ;</p>	<b>2</b>	
4(b)(i)	<p><i>any 5 of:</i></p> <ol style="list-style-type: none"> <li>1. provides a habitat / nursery grounds / breeding grounds ;</li> <li>2. increase in number of, coral / sponges / producers / <b>AW</b> ;</li> <li>3. <u>food chain / community</u> develops ;</li> <li>4. increase fish populations / description of <b>OR idea of</b>, increased fishing revenue / more fish for fishers ;</li> <li>5. ref. to, conservation / increases biodiversity ;</li> <li>6. reduce wave energy / dissipate dangerous waves ;</li> <li>7. reducing erosion ;</li> <li>8. brings tourism / increases revenue from tourism ;</li> <li>9. protection of harbours ;</li> </ol>	<b>5</b>	I ecosystem



Question	Answer	Marks	Guidance
4(b)(ii)	<p><i>any 8 of:</i></p> <ol style="list-style-type: none"> <li>1. litter / plastic / ghost nets / <b>AW</b> ;</li> <li>2. consumed by marine organisms (e.g. turtles / sea birds) / entraps marine organisms ;</li> <li>3. do not decompose ;</li> <li>4. oil ;</li> <li>5. smother organisms / ingested by organisms ;</li> <li>6. reduced photosynthesis / primary productivity / <b>AW</b> ;</li> <li>7. sewage / fertilisers / detergents / agricultural waste / aquaculture waste ;</li> <li>8. loss of oxygen / <b>AW</b> ;</li> <li>9. eutrophication / description of ;</li> <li>10. pesticides / heavy metals / named examples ;</li> <li>11. bioaccumulation / biomagnification / description of / pass along food chain ;</li> <li>12. affecting top predators (more) ;               <ol style="list-style-type: none"> <li>a) light / sound, pollution ;</li> <li>b) confusion (or scaring) of animals ;</li> <li>c) greenhouse gas increases ;</li> <li>d) climate change / global warming / coral bleaching / stated example of effect of (e.g. sea level rise, ocean acidification) ;</li> </ol> </li> </ol>	<b>8</b>	