



---

**MARINE SCIENCE**

**5180/02**

Paper 2

**October/November 2016**

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5180	02

Question	Answer	Mark	Additional Guidance
1(a)	1 236 965;	1	
1(b)(i)	2005;	1	
1(b)(ii)	226 315; tonnes ;	2	A tons / t
1(b)(iii)	344 189 (tonnes);	2	431 312 – 87 123 = 1 mark (I any extra stages in calculation)
1(b)(iv)	7.8;	2	A 7.815, 7.82;
1(c)	(overall catch has) increased;	1	I references to decrease at the end
1(d)	<i>any two of:</i> catch non-target species / bycatch / <b>AW</b> ;  catch juveniles / immature fish / young fish / <b>AW</b> ;  catch above MSY / overfishing / <u>over</u> exploitation / unsustainable fishing / <u>too</u> many taken / <b>AW</b> ;  ref. to ghost nets / <b>AW</b> , <b>OR</b> damage to coral reef;	2	A unwanted species / example of non-target species I ref. to endangered species  I small fish  A whole stock is taken

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5180	02

Question	Answer	Mark	Additional Guidance
1(e)	<p><i>any four of:</i></p> <ul style="list-style-type: none"> <li>a) idea of, ghost lines / entanglement;</li> <li>b) damage to sea bed / reefs;</li> <li>c) over-catch (some species);</li> <li>d) high by-catch rates;</li> <li>e) change migration patterns;</li> <li>f) cause schools to form in ecologically unsustainable areas / <b>AW</b>;</li> <li>g) ref. to rust / paint / toxic materials (entering sea);</li> <li>h) accumulation of predators / increase susceptibility to predation;</li> <li>j) spread of disease;</li> </ul>	4	<p>I habitats</p> <p><b>A</b> overfishing / catch over MSY / named species (tuna) / whole stock is taken / <u>too</u> many taken</p>
	<b>Total:</b>	<b>15</b>	

<b>Page 4</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge O Level – October/November 2016</b>	<b>5180</b>	<b>02</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
2(a)	16.4 parts per thousand;	<b>2</b>	<b>A</b> ppt <b>A</b> 16.4 = 1 mark
2(b)(i)	both axes suitable linear <b>scale</b> ; both <b>axes</b> labelled with units; <b>plots</b> correct $\pm \frac{1}{2}$ square; points joined by straight lines;	<b>4</b>	<u>x axis</u> must cover at least half grid bar chart gains mp1,2,3
2(b)(ii)	salinity = 33 (ppt); depth = 1 (m);	<b>2</b>	<b>A</b> 33–33.2 <b>A</b> 0.8–1.2 <b>ECF</b> from a candidate's graph
2(b)(iii)	as depth increases, salinity increases; <i>any one of</i> : salinity seems to be levelling off with depths greater than 2 m; greater change between 0 to 2 m; credit manipulation, e.g. overall increase in salinity of 16 ppt;	<b>2</b>	<b>ECF</b> from a candidate's graph I directly proportional

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5180	02

Question	Answer	Mark	Additional Guidance
2(b)(iv)	idea that as salinity increases, density of water increases / <b>ORA</b> ; therefore more dense / more saline water sinks / <b>ORA</b> ;	2	<b>A</b> saltwater is denser than freshwater
2(c)	<i>any three of:</i> evaporation; rainfall / precipitation; inflow of water from sea / ocean; inflow of water from rivers; meltwater from glaciers / <b>AW</b> ;	3	<b>A</b> runoff
	<b>Total:</b>	<b>15</b>	

Question	Answer	Mark	Additional Guidance
3(a)	transfer / modification; of, gene / DNA / allele / genome / genotype;	2	
3(b)	<u>many</u> , nucleotides / bases <b>OR</b> polymer of, nucleotides / bases; joined / bonded together / in a chain / <b>AW</b> ; credit ref. to DNA / RNA;	3	<b>A</b> named base(s) BUT must have idea of many  <b>R</b> ref. to other examples of polymer, e.g. protein

<b>Page 6</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge O Level – October/November 2016</b>	<b>5180</b>	<b>02</b>

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Additional Guidance</b>
3(c)(i)	a) (growth promoting) gene, <u>isolated</u> ; b) from different species; c) ref. to adding gene to trout <u>eggs</u> ; d) eggs develop into GM / GE trout; e) ref. to method;	<b>4</b>	<b>A allele / DNA</b>  e.g. injection (gene into egg) / restriction enzymes / ligase / electroporation / vector / virus

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5180	02

Question	Answer	Mark	Additional Guidance
3(c)(ii)	<p><i>economic</i>  <i>max. five of:</i></p> <ul style="list-style-type: none"> <li>a) higher set up costs;</li> <li>b) GM trout <u>grow</u> more quickly;</li> <li>c) so can get to market quicker;</li> <li>d) grow more trout in given time / higher yield;</li> <li>e) increased muscle / meat growth;</li> <li>f) increased revenue / profit / <b>AW</b>;</li> <li>g) consumer rejection (so decreased revenue);</li> <li>h) fall in price of trout;</li> </ul> <p><i>environment</i></p> <ul style="list-style-type: none"> <li>i) GM fish may escape / released;</li> <li>j) competition / description of, with wild stock;</li> <li>k) could breed with wild stock;</li> <li>l) idea of, food chain / food web effects;</li> </ul>	6	<p><b>A</b> can be produced more quickly</p> <p><b>A</b> market flooded / glut / supply greater than demand</p> <p><b>I</b> affects / interfere with, ecosystems</p>
	<b>Total:</b>	<b>15</b>	

Page 8	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5180	02

Question	Answer	Mark	Additional Guidance
4(a)	a) zooxanthellae; b) mutualistic; c) produce carbohydrates / <b>AW</b> ; d) nematocysts / stinging cells; e) associated with food capture; f) defence / protection; g) stomach (cavity); h) digestion (of food); i) mesenteries; j) increase (digestive) surface area; k) corallite; l) forms (hard) skeleton; m) of calcium carbonate; n) gonads; o) sexual reproduction / make gametes ;	10	<b>I</b> algae  <b>A</b> symbiosis   <b>A</b> cnidoblasts / cnidocytes   <i>needs to be some form of context to award function marks for each part if part is not named</i>          <b>I</b> coralline          <b>A</b> make eggs / sperm

Page 9	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2016	5180	02

Question	Answer	Mark	Additional Guidance
4(b)	<p><i>any five of:</i></p> <ul style="list-style-type: none"> <li>a) reduction in corals/less coral reef (as a result of mining);</li> <li>b) loss of habitats;</li> <li>c) loss of <u>biodiversity</u>;</li> <li>d) loss of nursery/breeding grounds/shelter;</li> <li>e) migration of fish away from reef;</li> <li>f) interrupts/destroys/affects, food <u>chains/webs</u>;</li> <li>g) pollution/sedimentation;</li> <li>h) suffocation of fish/gill damage (due to sediment);</li> <li>i) loss of fish <u>for a specific reason</u>, e.g. for bait, for aquaria, for food;</li> </ul>	5	<p>I damage to coral</p> <p>A idea of, increased vulnerability to predation, places to hide</p> <p>A loss of fish for fishermen</p>
	<b>Total:</b>	<b>15</b>	