CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the October/November 2015 series

9693 MARINE SCIENCE

9693/02 Paper 2 (AS Data Handling and Free-Response), maximum raw mark 50

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.

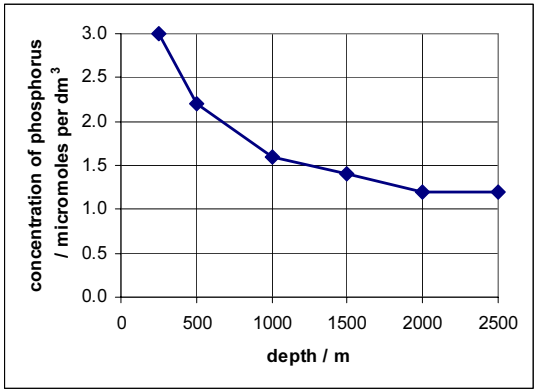
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

CAMBRIDGE
International Examinations

Question	Expected answers	Additional guidance	Marks
1 (a)	second (trophic level) ; limpets are herbivores / feed on producers / are primary consumers ;		[2]
(b) (i)	any 3 of: periwinkles found on lower shore, limpets found on middle of shore / AW ; periwinkles more widely distributed / found in 8 quadrants, limpets found in 6 quadrants ; limpets distributed over 10 m, periwinkles over 14 m ; neither species found at 0 m / at top of shore / 26 to 30 m ;		[3]

(ii)	any 3 of: immersion time / exposure / AW ; wave action ; temperature ; availability of food ; predators ; competition ;		[3]
(c) (i)	mean on exposed shore = 22.7 ; mean on sheltered shore = 16.4 ;		[2]
(ii)	limpets have flatter shells on a sheltered shore / converse / AW ;		[1]
			[Total: 11]

Question	Expected answers	Additional guidance	Marks
2 (a)	suitable linear **scale** ; both **axes** labelled with units **+** correct orientation ; all points **plotted** correctly ; points joined accurately with ruled **lines +** no extrapolation ;	sample graph:  	[4]
(b)	as depth increases, the concentration of phosphorus decreases / converse ; reference to non-linear ; credit a quantitative reference, e.g. overall change in phosphorus of 1.8 μmol dm $^{-3}$;		[3]
(c)	reference to increased productivity ; producers need phosphorus for DNA ;	**Accept** other P-containing organic substances, e.g. ATP, phospholipids, etc.	[2]
			[Total: 9]

Question	Expected answers	Additional guidance	Marks
3 (a)	any 4 of: reference to tectonic plates moving apart ; or together ; subduction ; leaving fissures / AW ; sea water moves in ; heated by (hot) magma ; hot water (and dissolved minerals) re-emerges / AW ;		[4]
(b)	reference to hydrothermal vents as extreme environments ; credit **two** conditions associated with hydrothermal vents, e.g. high temperature, acidity, high pressure, no light ; ; few organisms adapted to survive ; credit an example of an organism associated with hydrothermal vent, e.g. tube worms ;		[5]

(c)	any 6 of: reference to bacteria ; chemosynthesis ; oxidise inorganic substances, e.g. H_2S ; fix carbon dioxide ; to form organic substances / named example ; for higher other organisms / higher trophic levels ; credit reference to chemosynthetic bacteria forming a symbiotic relationship with tube worms / clams ;		[6]
			[Total: 15]

Question	Expected answers	Additional guidance	Marks
4 (a) (i)	the place where an organism lives ;		[1]
(ii)	organisms of different <u>species</u> ; living in the same habitat / AW ;		[2]
(b)	any 4 of: as numbers of herring increases ; more food available to striped bass ; (therefore) striped bass numbers increase ; reference to cyclic changes / graph showing changes ; may be no relationship if striped bass have alternative food source / if striped bass are not a major predator of herring ;	**Accept** converse points	[4]

(c)	increased hydrodynamic efficiency / reduced drag ; increases swimming speed ; saves energy ; increases foraging efficiency / AW ; protection from predators ; shoal includes males and females ; proximity of mates ; increases chances of fertilisation ;		[8]
			[Total: 15]