Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/43**

Paper 4 Theory (Extended) **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.

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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.

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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.

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Question	Answer	Marks	Guidance
1(a)(i)	(level) 3 / tertiary / secondary consumer ;	**1**	
1(a)(ii)	*Myrmarachne* ;	**1**	
1(a)(iii)	dichotomous (key) ;	**1**	
1(b)(i)	exoskeleton ; jointed / segmented, legs / AW ; (at least) 1 (or more up to 6) / (at least 1) (or more up to 3) pair, of legs / AW ; segmented (body) ; bilateral body symmetry ;	**2**	
1(b)(ii)	two body parts ; eight legs / four pairs of legs ; AVP ;	**2**	
1(b)(iii)	**B C D E** (in any order) ;;	**2**	
1(c)	anatomy ; DNA (sequences) / genes ; sequences of amino acids (in proteins) ; AVP ; e.g. behaviour	**1**	

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Question	Answer	Marks	Guidance
2(a)(i)	(glucose is produced by) photosynthesis **;** light (energy) is, trapped / AW, by chlorophyll **;** light energy is converted to chemical energy **;** carbon dioxide and water, are used / react together / AW **;** to produce (glucose and) oxygen **;**	**3**	
2(a)(ii)	translocation **;**	**1**	
2(a)(iii)	(sometimes roots) release / AW, energy / glucose / sucrose / (named) sugar **;** for respiration **;** example of use of energy in a plant **;** e.g. flowering / new, leaves / growth / plant sometimes leaves cannot produce enough, glucose / carbohydrates **;**	**2**	
2(b)(i)	**Q** phloem **;** **S** xylem **;**	**2**	
2(b)(ii)	**1** *ref to* <u>osmosis</u> (of water / across / bag / membrane) **;** **2** water moves into, (source) bag / sucrose solution **;** **3** from high water <u>potential</u> to low water <u>potential</u> **;** **4** sucrose (molecules) cannot cross the (partially permeable) membrane **;** **5** sucrose is too large (to fit through partially permeable membrane) **;** **6** (water moving in) increases the pressure / volume, of solution in (source) bag **;** **7** (increased, volume / pressure / water moving in) forces / pushes, the solution up (tube **Q) ;** **8** volume of bag<u>s</u> has not increased / water has moved out of the (sink) bag **;** **9** sucrose diffuses (along tube **Q**) **;** **10** down a (sucrose) concentration gradient (between source and sink) **;**	**4**	

Question	Answer	Marks	Guidance
2(c)	the sucrose concentration / water potential (in the two bags) is the same / AW **;**	**1**	
2(d)	nitrate (ions) **;**	**1**	

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Question	Answer	Marks	Guidance
3(a)	**1** ingestion / digestion / described, occurs in mouth **;** **2** chemical digestion / absorption / described, occurs in small intestine / duodenum / ileum **;** *ingestion of large biological molecules* **3** mechanical / physical, digestion / breaking, carbohydrate / food, into small pieces **;** **4** *ref to* chew / grind / bite / by teeth / tongue / swallow / moves through oesophagus / churned in stomach **;** *chemical digestion* **5** breakdown insoluble molecules into (smaller) soluble molecules **;** **6** salivary (glands) / pancreas, secrete amylase **;** **7** amylase breaks down, starch, to, maltose / glucose / sugar **;** **8** maltase is on epithelium of the, small intestine / duodenum / ileum **;** **9** maltase breaks down maltose to glucose **;** **10** bile neutralizes (stomach) acid **;** **11** *ref to* neutral / 7 / 8 pH for, amylase / maltase **;** *absorption into the blood via the alimentary canal* **12** by diffusion / active transport, into villi / microvilli / capillaries **;** **13** microvilli / villi / folds, increase the surface area (for absorption) **;** *increased blood glucose concentration* **14** insulin, secreted / produced / AW, from pancreas **;** **15** insulin reduces blood glucose concentration **;** **16** *ref to* negative feedback / homeostasis / described **;**	**8**	

Question	Answer	Marks	Guidance
3(a)	*assimilation in the liver* **17** glucose, stored as / converted to, glycogen (in liver) **;** **18** (assimilated) into, cell / tissues to become part of cell / *ref. to* respiration / for release of energy **;**		

3(b)	*calcium ion:*
	for (the formation / maintenance, of healthy / strong) bones **;**
	for (the formation / maintenance, of healthy / strong) teeth **;**
	AVP **;;**
	
	iron ions:
	found in / AW, haemoglobin (molecule) / red blood cell **;**
	transport oxygen **;**
	prevent anaemia **;**
		4	

3(c)(i)	stress **;** smoking **;** genetic predisposition / family history **;** age **;** sex **;** activity level / AW **;** any pre-existing medical conditions / AW **;** alcohol / drug / medication **;** obesity / weight / mass / BMI / AW **;**	**2**	
3(c)(ii)	(excess) salt is, excreted / removed from body (in urine) **;** some salt is (re)absorbed in the, kidney / tubules / into the blood **;** people are not reliable in recording / remembering / measuring how much salt they eat **;**	**2**	
3(d)(i)	(reduce) fat / cholesterol **;** (increase) fibre / roughage **;** (increase) water **;**	**1**	

Question	Answer	Marks	Guidance
3(d)(ii)	low = 16.8 (kPa) **and** high = 17.7 (kPa) **;** 5(%) **;;**	**3**	
3(d)(iii)	low salt diets reduce (systolic) blood pressure / risk of CHD **; ora** modified diets / group 2, reduce (systolic) blood pressure / risk of CHD **; ora** any description of an interaction between the salt diet and modified diets together affecting the, blood pressure / risk of CHD **;** comparative data quote with units **;**	**3**	
4(a)(i)	*use of trees* paper **;** (as building materials) for furniture / construction / poles / boats / AW **;** firewood / fuel **;** to sell **;** *clearance of trees for* agriculture **;** urbanisation / roads / housing / factories / industry / developments **;** extraction of, minerals / natural resources **;**	**3**	
4(a)(ii)	education **;** replanting / reforestation / afforestation **;** government policies / legal quota / penalties / controls / bans / rules / AW **;** management of conflicting demands **;** co-operation with local communities **;** protected area / national parks / wardens **;** AVP **;** e.g. selective felling	**3**	
4(b)(i)	house mouse **;**	**1**	

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Question	Answer	Marks	Guidance
4(b)(ii)	*for hypothesis* all native / nearly all / more / most, species prefer large areas of forest **; ora** comparative data quote for one mammal, between both areas as a percentage or last column **;** heavier / larger, mammals are more (negatively) affected by the breakup of large areas (than smaller mammals) **; ora** *against hypothesis* not true for, introduced species / black rat / house mouse **;** comparative data quote for <u>black</u> rat / mouse, between both areas as a percentage **;** cannot make (broad) conclusion on, only study / one area **;** AVP **;**	**4**	

Question	Answer	Marks	Guidance
5(a)	**1** nucleus / chromosome(s) **;** **2** bases **;** **3** protein **;** **4** genes / alleles **;** **5** <u>same</u> **;** **6** sticky **;** **7** recombinant **;** **8** bacteria / vectors / viruses / yeast / (prokaryotic / host) cells **;** **9** insulin **;**	**9**	
5(b)	washing powders **;** (pectinase) for (fruit) juice production **;** (lactase) for lactose-free milk **;** AVP **;**	**2**	

Question	Answer	Marks	Guidance
6(a)	*ref. to* platelets **;** fibrinogen is converted to fibrin / **L ;** fibrinogen is soluble / fibrin is insoluble **;** (**L** / fibrin) forms a, mesh / AW **;** (**L** / fibrin) traps / AW, blood cells / **J** / **M ;** **J** is a red (blood) cell **;** **L** is fibrin **;** **M** is a, white (blood) cell / lymphocyte / phagocyte **;**	**5**	
6(b)	prevents blood loss / AW **;** prevent (named) pathogens entering a wound **;**	**2**	
6(c)(i)	observable features (of an organism) **;**	**1**	
6(c)(ii)	co-dominance **;**	**1**	
6(c)(iii)	I^AI^A **;** I^Ai^o **;**	**2**	