Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/41**

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.

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.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

© UCLES 2019

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.

© UCLES 2019

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.

© UCLES 2019

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance Notes</th></tr>
<tr><td>1(a)</td><td>many (body) segments ;
head and, body (segments) / AW ;
many legs / many pairs of legs;
elongated bodies ;</td><td>2</td><td></td></tr>
<tr><td>1(b)</td><td>crustaceans ;
arachnids ;
insects ;</td><td>2</td><td></td></tr>
<tr><td>1(c)</td><td><table><tr><th>class</th><th>letter(s) of species from Fig. 1.3 in each class</th></tr><tr><td>1</td><td>J</td></tr><tr><td>2</td><td>L</td></tr><tr><td>3</td><td>M,</td></tr><tr><td>4</td><td>K,N,O</td></tr></table>;;;</td><td>3</td><td>4 rows correct = 3
2 or 3 rows correct = 2
1 row correct = 1</td></tr>
<tr><td>1(d)(i)</td><td>(genus) Apheloria ;
(kingdom) animal ;</td><td>2</td><td></td></tr>
<tr><td>1(d)(ii)</td><td>no (aerobic) respiration ; ora
cannot release energy ; ora</td><td>1</td><td></td></tr>
</table>

© UCLES 2019

Question	Answer	Marks	Guidance Notes
2(a)	*carbohydrates* cellulose ; for cell walls ; starch ; for energy/respiration ; to attract insects to flowers / nectar / fruits ; *amino acids* to make (named) proteins ; for enzymes ; for growth ; AVP ;	**4**	
2(b)	correct position labelled on the leaf ; correct position labelled on the stem ; correct position labelled on the root ;	**3**	
2(c)(i)	higher concentration in the stem / aphid **D** is nearer the root / is before the branching of the plant ; (sucrose moves by) translocation ; sucrose moves up the plant ; root / tuber, is a source ; (leaves / stems / AW) are a sink ; no photosynthesis (in the dark) ; no / less, glucose/sucrose (made in the leaves) ; plant uses stored starch (from root) / AW ;	**3**	
2(c)(ii)	insert gene / ref. to genetic engineering / ref. to genetic modification ; gene, for insect / aphid resistance ; ref. to insecticide / described ; AVP ; description of how insecticide applied / biological control / grow in glasshouses / netting	**3**	

© UCLES 2019

Question	Answer	Marks	Guidance Notes
2(c)(iii)	pollination **;** AVP **;** e.g. biological control described / insect products e.g. honey	**1**	

Question	Answer	Marks	Guidance Notes
3(a)	remove from the, body / organism / cell ; waste / poisons / toxins / harmful substances ; (waste products) of metabolism / respiration ; (named) substances in excess ;	**2**	
3(b)	the outline shape of a kidney, with one tube attached, drawn ; tube labelled ureter, outer portion of kidney labelled as cortex, medulla labelled inside the kidney ;	**2**	
3(c)(i)	ref. to capillaries ; (capillaries are) one cell thick / thin / AW ; *idea of* fenestrations / pores ; network (of capillaries) / tangled / knotted / tightly packed tubes ; description of shape e.g. round / ball-shaped ;	**2**	
3(c)(ii)	provides blood at high pressure ; provides a large surface area ; (ultra)filtration ; *ref. to* small *or* soluble molecules / water / glucose / urea / salts, (are filtered) out ; *ref.* to (named*)* large OR insoluble (molecules) / blood cells, stay in the glomerulus ; AVP ;	**2**	
3(d)(i)	(by) active transport ; from a low to a high concentration / AW ; (through cell) membrane ; ref. to proteins (pumps / channels / AW) ; uses energy ; from respiration ;	**4**	

© UCLES 2019

Question	Answer	Marks	Guidance Notes
3(d)(ii)	*human* 575 ÷ 320 =1.797 or 1.8 *mouse* 0.551 ÷ 0.31 ; =1.778 or 1.8 ; g (salt) per day per g (kidney) ; similar or the same, results / rates / ratios, so hypothesis is supported ;	**4**	
3(d)(iii)	osmosis ;	**1**	
3(d)(iv)	glucose / AVP ;	**1**	

Question	Answer	Marks	Guidance Notes
4(a)	(named) mechanical (barriers) ; (named) chemical barriers ; ref. to active immunity ; white blood cells / lymphocytes / phagocytes ; (phagocytes) engulf (named) microorganisms / phagocytosis ; lymphocytes produce antibodies ; ref. to specific, antigens / pathogens ; ref. to long term immunity / memory cells ; AVP ;	**5**	
4(b)	antibiotics ;	**1**	

Question	Answer	Marks	Guidance Notes
5(a)(i)	coronary artery ;	**1**	
5(a)(ii)	ref. to platelets ; fibrinogen converted to fibrin ; soluble to insoluble ; forms a mesh ; traps, (red blood) cells ;	**3**	
5(a)(iii)	aspirin / AVP ;	**1**	
5(b)(i)	98 (%) ;;;	**3**	one mark for correct readings from graph one mark for correct calculation one mark for correctly rounding to a whole number

© UCLES 2019

Question	Answer	Marks	Guidance Notes
5(b)(ii)	*argument for:* as exercise increased CHD deaths decreased **; ora** comparative data quote with units **;** the same group of people were studied **;** regular measurements were taken **;** large benefit for doing only a small amount of exercise (therefore easy to do) **;** even if there are some doubts about the benefits no harm will be done / AW **;** *argument against:* only women in the study **; ora** none younger than 35 (at the start of the study) **; ora** actual number of deaths per 10 000 is very small even for those that do not exercise **;** other risk factors not considered **;** named examples of other risk factors **;;** e.g. diet / smoking / alcohol / genetics some women may have forgotten / not answered correctly about how much exercise they did / AW **;** some women may have been successfully treated for CHD / not died from the condition / AW **;** other variables not considered **;** e.g. pre-existing conditions / medication / type of exercise / length of exercise	**5**	
5(c)	more <u>blood</u>, to muscles **;** to deliver more, oxygen / glucose **;** for muscle <u>contraction</u> **;** for (aerobic) respiration **;** more <u>energy</u> required **;** ref. to adrenaline **;**	**3**	

Question	Answer	Marks	Guidance Notes
6(a)	poor absorption of calcium / weak bones / weak teeth / depression / fatigue / muscle pain / joint pain / rickets / osteomalacia / AVP **;**	**1**	
6(b)	*reasons why endangered:* (described) overfishing / hunting **;** food chain disrupted (described)**;** overconsumption (by humans) **;** (named) pollution **;** introduced diseases / species **;** habitat destruction **;** climate change **;** *risks if populations drop:* reduced variation **;** reproduction rate is lower / harder to find a mate **;** extinction **;** AVP **;** *how to maintain fish stocks:* education **;** quotas **;** no-catch zones / nursery zones / seasonal fishing / protected areas / MPAs / Marine Protected Areas **;** fines **;** restocking **;** fish farms **;** method of fishing (described) **;** AVP **;**	**6**	

Question	Answer	Marks	Guidance Notes
7(a)(i)	(named) bacteria ; lightning ; AVP ;	**2**	
7(a)(ii)	*process **A*** denitrification ; *process **B*** nitrification ;	**2**	
7(a)(iii)	ammonia / ammonium (ions) ;	**1**	**A** nitrite (ions)
7(a)(iv)	removal of nitrogen containing part of amino acids ; to form urea ;	**2**	
7(b)	ribosome / rough endoplasmic reticulum ;	**1**	
7(c)	protease / pepsin / trypsin ;	**1**	

© UCLES 2019