Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/42**

Paper 4 Theory (Extended) **March 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 March 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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)	removal from the, body / organism / cell ; toxic substances ; waste product(s), of metabolism / respiration ; (named) substances in excess (of requirements) ;	**3**	
1(b)	**A** – medulla ; **B** – cortex ; **C** – renal vein ;	**3**	
1(c)(i)	9900 (%) ;;	**2**	
1(c)(ii)	concentration of salts is the same in the blood in the renal artery **and** the fluid in the kidney tubule ; concentration of salts, increases between the blood in the renal artery and the fluid in the kidney tubule and the urine / (approximately) doubles ;	**2**	
1(c)(iii)	proteins are (too) big (to be filtered) / AW ;	**1**	
1(c)(iv)	(all) glucose is reabsorbed ;	**1**	
1(d)	*idea of convenience:* no need to visit hospital / time not taken up with dialysis ; no need for a restricted diet ; *idea of* improved quality of life / AW ; cost effective in the long term ; ref. to having a working kidney / long-lasting / ref. to cure / one-time treatment ;	**3**	

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Question	Answer	Marks	Guidance
2(a)(i)	(large) petals ;	1	
2(a)(ii)	self-pollination is within the same, plant / flower ; OR cross-pollination is between different plants (of the same species) ;	1	
2(a)(iii)	prevents extinction / enables survival of species ; more chances of fertilisation ; more chances of pollination ; no need for (named) pollinators ; useful if plants are (geographically) isolated / on their own / AW ; parent plants adapted to the environment, pass alleles to offspring / AW ; *idea of* sexual reproduction better than asexual reproduction for variation ;	3	
2(b)(i)	both alleles are, expressed / neither allele is, dominant / recessive to the other ; the phenotype (of heterozygote is), intermediate / new / different / AW ; presence of multiple alleles, for one trait ;	2	
2(b)(ii)	*gametes:* C^R , C^W + C^R , C^W ; *offspring genotypes:* C^RC^R, C^RC^W, C^RC^W, C^WC^W ; *offspring phenotypes:* red pink white ; *ratio:* 1 : 2 : 1 ;	4	
2(b)(iii)	(parents phenotypes must be) red and white ; offspring must, inherit a C^R and a C^W allele / be heterozygous ;	2	

Question	Answer	Marks	Guidance
3(a)	(**A**) **D C F B G** (**E**) ;	**1**	
3(b)	correct ref. to neurotransmitter ; released from vesicles (into synapse / synaptic gap) ; ref. to movement (of neurotransmitter) by diffusion ; (neurotransmitter) binds with receptor (molecules on neurone on the other side of synapse) ; causing impulse to continue / AW ;	**4**	
3(c)(i)	depressant ; increases reaction times / slows down impulses / slows down the nervous system ; ref. to effect on synapse / AW ; loss of self-control / mental function is affected / inability to walk or talk ; AVP ;;;	**3**	
3(c)(ii)	sleeplessness / insomnia / restlessness ; fatigue / yawning ; diarrhoea ; hallucinations ; anxiety / depression / mood swings / aggression / irritation / confusion ; muscle cramps / aches / pain ; nausea / vomiting ; headaches / dizziness ; shivering / chills / fever ; itching ; runny nose / sweating / clammy skin / crying ; dehydration / (extreme) thirst ; rapid heart rate / hypotension ; AVP ; cravings / double vision	**2**	
3(c)(iii)	(addicts) turn to crime to finance their addiction / AW ;	**1**	

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4(a)</td><td>
<table>
<tr><th>pollutant</th><th>source</th><th>effect on environment</th></tr>
<tr><td>sulfur dioxide ;</td><td>(burning) fossil fuels ;</td><td>acid rain</td></tr>
<tr><td>carbon dioxide</td><td>(burning fossil) fuels ;</td><td>enhanced greenhouse effect</td></tr>
<tr><td>methane ;</td><td>cattle and rice farming</td><td>enhanced greenhouse effect</td></tr>
<tr><td>fertilisers</td><td>arable agriculture</td><td>eutrophication</td></tr>
</table>
</td><td>4</td><td></td></tr>
<tr><td>4(b)(i)</td><td>(named) fertiliser leached into, rivers / streams / lakes ;
producer growth / algal bloom / algae growth / plant growth ;
death of producers ;
increased decomposition / increased decomposers ;
increased respiration (aerobic) ;
decomposers use up the oxygen in the water ;
organisms / fish / creatures, die / suffocate / migrate, due to lack of oxygen ;
AVP ;</td><td>6</td><td></td></tr>
<tr><td>4(b)(ii)</td><td>use, less / correct amount, of fertiliser / calculate how much fertiliser is needed ;
use slow-release fertilisers ;
do not apply, during / after, rain / when rain is forecast / limit watering ;
do not use near water / make channels between land and water body ;
only apply when crops, will take-up fertiliser / are growing ; ora</td><td>2</td><td></td></tr>
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Question	Answer	Marks	Guidance
5(a)(i)	**1** leaf **A** / thick cuticle, lost the least mass / water **;** **2** leaf **C** / thin cuticle, lost the most mass / water **;** **3** leaf **B** / medium cuticle, lost more mass or water than **A** / less mass or water than **C** **;** **4** loss of mass is due to the loss of water **;** **5** the thicker the cuticle the, less water / mass, lost **;** **6** loss of, mass / water, fastest initially (then slows) **;** **7** ref. to transpiration / (reduced) evaporation **;** **8** data manipulation with ref. to mass **;** e.g. calculation of loss	**5**	
5(a)(ii)	less, water / mass, loss (from leaves **A**, **B** and **C**) **;** *idea of* the same pattern of results as the first experiment **;** reduced transpiration **;** increased water (concentration) in the air **;** ref. to a smaller concentration gradient **;** less diffusion of water <u>vapour</u> **;**	**3**	
5(b)	*stem* – swollen / AW **;** *root* – extensive / widespread / shallow (root system) / AW **;**	**2**	**A** deep / branched
5(c)(i)	carbon dioxide **;**	**1**	
5(c)(ii)	respiration **;** starch **;** cellulose **;** chlorophyll **;** sucrose **;** nectar **;** amino acids / protein **;** fats / oils **;** nucleic acids / DNA / RNA **;** growth of (any named part) membrane, cell wall, cytoplasm **;**	**3**	

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Question	Answer	Marks	Guidance
6(a)(i)	***X*** protein (coat) / AW ; ***Y*** genetic material ;	**2**	
6(a)(ii)	cell wall ; cell membrane ; cytoplasm ; loop of DNA ; (slime) capsule ; flagella ; plasmid ; ribosome ;	**2**	
6(b)(i)	food ; contaminated surfaces ; animals ; air ; water ; soil ;	**2**	
6(b)(ii)	skin / epidermis ; hairs in nose ; mucous membrane ; mucus ; ear wax ;	**2**	
6(c)	a pathogen has antigens (on their surface) ; ref. to specificity / antibodies have complementary shape (to antigen) ; lock onto (specific) antigens / pathogen ; destroy pathogens ; marking for destruction / phagocytosis ; AVP ;	**4**	
6(d)	long-term / ref. to permanent / protects against some recurring diseases ; produces memory cells ; antibodies are produced (by the body) ; slower response ;	**3**	

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