Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

BIOLOGY **5090/21**

Paper 2 Theory **May/June 2018**

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.

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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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Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
()	contents of brackets are not required but should be implied
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
Ig	ignore (for incorrect but irrelevant responses)
AW	alternative wording (where responses vary more than usual)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
underline	actual word underlined must be used by candidate
+	statements on both sides of the + are needed for that mark

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)(i)</td><td>(1)
6 ;
3 ;
3 ;
3 ;</td><td>4</td><td></td></tr>
<tr><td>1(a)(ii)</td><td>correct shape ;

correct labels ;</td><td>2</td><td></td></tr>
<tr><td>1(b)</td><td>
<table>
<tr><td colspan="2">more plants / growth of plants / more leaves / algal bloom AW ;</td></tr>
<tr><td colspan="2">eutrophication ;</td></tr>
<tr><td>reference to nitrate production for protein ;</td><td>decomposition / O_2 used or respiration by bacteria ;</td></tr>
<tr><td>more food for water beetle / snail ;</td><td>less food for water beetle / snail ;</td></tr>
<tr><td>more food for frogs ;</td><td>less food for frogs ;</td></tr>
<tr><td>population of frogs increases ;</td><td>population of frogs decreases ;</td></tr>
</table>
</td><td>4</td><td>If the account is in a logical sequence, marks may be awarded from either side of table</td></tr>
</table>

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Question	Answer	Marks	Guidance
2(a)(i)	sperm **;**	**1**	
2(a)(ii)	testis correctly labelled with **X ;**	**1**	
2(a)(iii)	sperm cells / gamete **+** meiosis **OR** other cells **+** mitosis **;** different allele combinations on chromosomes **;** reference to (nucleus of sperm) haploid / half number **AW ;** reference to restoration of diploid / full number **AW ;** (upon) fertilisation / fusion of gametes **;**	**3**	Marks can be awarded under *cause of difference* or *explanation*
2(b)	male / sperm **+** small(er) **;** male / sperm **+** motile / mobile / can swim **AW ;**	**2**	
2(c)	zygote **;** fertilisation **;** uterus / womb **;**	**3**	

Question	Answer	Marks	Guidance
3(a)	reference to structures on top of fruit **;** increases surface area **;** delays descent **/** wind catches beneath structures / floats **AW ;**	**3**	
3(b)(i)	time taken increases **+** distance travelled increases **OR** proportional **;**	**1**	
3(b)(ii)	6 **;**	**1**	

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Question	Answer	Marks	Guidance
3(b)(iii)	(fruits / seeds) will travel further **;** away from plant **;** away from other fruit / seeds / scattered **;** colonise other areas **;** reduced competition / prevent overcrowding **;** competition for light / water / nutrients **;** increased chance of **+** new plant / reproduction / germination **AW ;**	**4**	
3(c)	*environmental condition* temperature / water / oxygen **;** *explanation* **;** • (temperature) reference to enzyme activity • (water) reference to solution / softening / rupture of testa / enzyme activity / transport • (oxygen) reference to respiration	**2**	**R** air

Question	Answer	Marks	Guidance
4(a)	contain oxygenated blood: **A + B + C ;** contain deoxygenated blood: **D + E + F ;**	**2**	**A** one or two correct letters in both boxes for 1 mark in total
4(b)(i)	blood to or from the lungs: any two of **F + B + C ;** three correct **F + B + C ;;** blood to or from the body tissues: any two of **A + D + E ;** three correct **A + D + E ;;**	**4**	

Question	Answer	Marks	Guidance
4(b)(ii)	higher (to the body tissues) **AW ;**	**1**	
4(b)(iii)	left ventricle **;** thicker **AW ;** muscle **;** greater **+** contraction / force (applied to blood) **AW ;**	**3**	**ORA** for right ventricle for all points

Question	Answer	Marks	Guidance
5(a)(i)	very **AW** small **;** protein coat / capsid **;** no membrane **/** no cytoplasm / no nucleus / non-cellular **/** no organelles **;** nucleic acid / DNA / RNA **;** parasitic / (may be) pathogen(ic) / cause disease / non-living **AW ;** unaffected by antibiotics **;**	**3**	
5(a)(ii)	reference to immune / immunity (system or affected) **;** reference to reduced **AW +** antibody production **;** reference to reduced **AW +** phagocytic action **;**	**2**	
5(b)(i)	barrier contraception / correct named contraceptive method e.g. condom **;** abstinence **;** only one partner **AW ;** reference to use of anti-retroviral drugs **;**	**2**	**A** avoid unprotected sex
5(b)(ii)	sharing **+** needles / sharp objects / toothbrushes **;** blood transfusion / contact **;** from mother to baby / across placenta / during birth / during breast-feeding **;**	**2**	

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Question	Answer	Marks	Guidance
6	*(**J**)* cuticle **;** waterproof / waxy **AW ;** prevents / reduces **+** water loss / transpiration / evaporation **;** *(**K**)* xylem **;** transport **+** water **;** from named location to named higher location **;** *(**L**)* spongy **;** air / intercellular **+** spaces **;** water film **AW ;** evaporation / water vapour **;** diffusion **;** *(**M**)* stoma / stomata **;** guard cell **;** open / close **;** reference to water vapour **+** exits **;** diffusion **;**	**10**	**Note** marking points must **not** be transferred between the sections **R** ‘phloem’ for xylem

Question	Answer	Marks	Guidance
7(a)	form / version ; gene ; reference to codes for / specifies production of **+** protein ; reference to dominant / codominant / recessive ;	**2**	
7(b)	BB ; x Bb ; B **+** B **+** B **+** b ; BB **+** Bb ; Bb (black) ; x bb (white) ; B **+** b **+** b **+** b ; Bb **+** bb ;	**8**	**Allow** any order within each marking point

Question	Answer	Marks	Guidance
8(a)	named stimulus / trigger for a specific reflex action ; correct named receptor for stimulus given ; action described correct for example given ; importance of specific action explained ;	**4**	
8(b)	synapse (anywhere in sequence) ; impulse / electrical pulse (anywhere in sequence) ; receptor ; detection of stimulus ; **then** sensory neurone ; relay / inter(mediate) / connector neurone ; reference to CNS / brain / spinal cord ; **then** motor neurone ; effector / named effector ; action of effector or described ;	**6**	**Ig** signal / message

Question	Answer	Marks	Guidance
9(a)	parameter / condition e.g. temperature **;** change from set point / norm **AW ;** detected **;** reference to communication or named method (e.g.nerve / impulse / hormone) **;** reference to control centre / coordinator / hypothalamus / brain **;** response / corrective mechanism(s) **;** reversal /correction of initial change / return to set point or norm **;**	**4**	

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Question	Answer	Marks	Guidance
9(b)	any two from nerve ending / blood vessels / sweat gland / hair **;;**	**2**	
	(nerve ending) detects / receptor **;** change / increase in temperature **;** impulse / (message) to brain **;** *(blood vessels)* dilate **;** more blood to surface of skin **;** reference to capillaries **;** reference to increased radiation / heat loss **;** *(sweat gland / duct*) secretion / release / skin surface **+** sweat **;** reference to evaporation **;** *(hair)* lowers **;** less air trapped / loss of insulation **;**	**4**	**A** if with reference to capillaries