Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education (9–1)

BIOLOGY (9–1) **0970/31**

Paper 3 Theory (Core) **May/June 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 May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U 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:

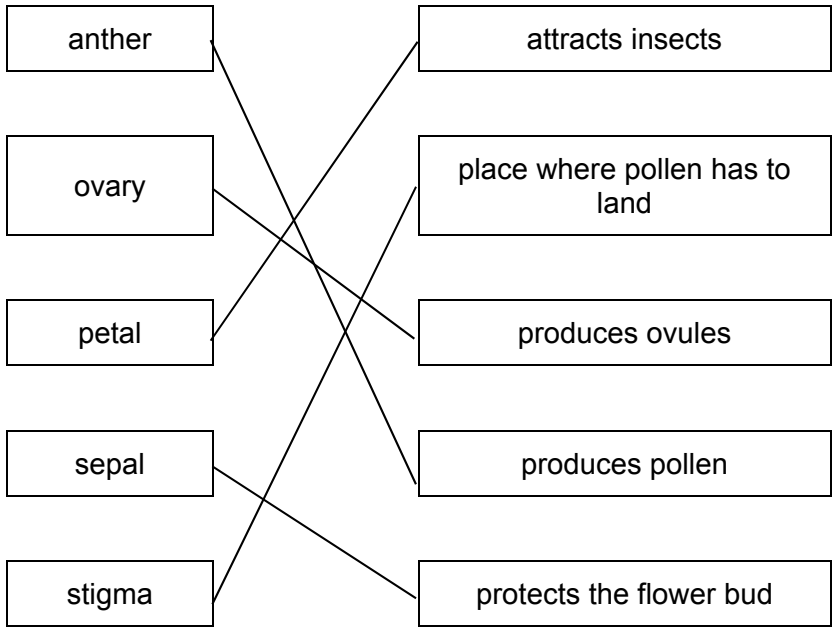
Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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.

Question	Answer	Marks	Guidance
1(a)	 ;;;;;	**5**	one mark for each correct line
1(b)	small(er) ; light(er) / less mass ; smooth(er) / not rough / not spiky / AW ; not sticky ; have, wings / extensions / air bladders or sacs ;	**2**	

Question	Answer	Marks	Guidance
1(c)	sexual ; oxygen ; water ; gravity / light ; water / oxygen / mineral ions ;;	**6**	mp2 and mp3 in either order

Question	Answer	Marks	Guidance
2(a)	<table><tr><td rowspan="2">characteristic</td><td colspan="3">arthropod group</td></tr><tr><td>arachnids</td><td>crustaceans</td><td>myriapods</td></tr><tr><td>four pairs legs</td><td>✓</td><td></td><td></td></tr><tr><td>one pair antennae</td><td></td><td></td><td>✓</td></tr><tr><td>two main body parts</td><td>✓</td><td></td><td></td></tr></table> ;;;	**3**	one mark for each correct row
2(b)	movement ; respiration ; sensitivity ; growth ; reproduction ; excretion ; nutrition ;	**4**	

Question	Answer	Marks	Guidance
2(c)(i)	oxygen used by arthropods ; correct reference to (aerobic) respiration **;** carbon dioxide / water (vapour), is given out / released ; carbon dioxide / water (vapour), is absorbed **;** (so) volume of air (in the container) decreases / pressure in the container decreases **;**	**3**	
2(c)(ii)	as the temperature increases the (rate of) dye movement increases / AW **;**	**1**	
2(c)(iii)	90(%) **;;**	**2**	

Question	Answer	Marks	Guidance
3(a)	<table><tr><th>function</th><th>letter</th></tr><tr><td>egestion</td><td>**K ;**</td></tr><tr><td>lipase made</td><td>**G ;**</td></tr><tr><td>mechanical digestion</td><td>**A / F ;**</td></tr><tr><td>most water absorption</td><td>**J ;**</td></tr></table>	**4**	
3(b)(i)	bacterium / bacteria **;**	**1**	
3(b)(ii)	loss of watery faeces / AW **;**	**1**	
3(b)(iii)	<u>oral rehydration</u> therapy **;** intake of water containing, salt / ions, and sugar **;** AVP **;;**	**2**	
3(c)	skin **;** hairs in the nose **;** mucus (traps pathogens) **;** acid in the stomach **;** white blood cells / phagocytosis / antibodies **;;** AVP **;;**	**2**	

Question	Answer	Marks	Guidance
4(a)	line ending on and labelled nucleus ; line ending on one of the chloroplasts and labelled ;	**2**	
4(b)(i)	cell contents / cytoplasm / (cell) membrane, shrunk ; vacuole smaller ; cell membrane separates from cell wall ; external solution fills space between cell wall and cell membrane ;	**2**	
4(b)(ii)	water moves out of the cell ; osmosis (in correct context) ; through a partially permeable membrane / AW ; sugar solution more concentrated than cell contents / AW ;	**3**	
4(b)(iii)	add / place in, water OR dilute / less concentrated, sugar solution / AW ;	**1**	
4(c)(i)	xylem ;	**1**	
4(c)(ii)	xylem correctly labelled **W** on all three diagrams ;;;	**3**	

Question	Answer	Marks	Guidance
5(a)	animal that gets its energy **;** by eating plants **;**	**2**	
5(b)	increased, food supply / plants**;** less predation / less hunting / AW **;** less disease / AW **;** more births / fewer deaths **;**	**2**	
5(c)	damage / destroy, (marine) habitats **;** extinction of species **;** reference to pollution (of sea) **;** global warming / ref. to increase in sea temperature ; rise in sea levels / melting of ice-caps **;** overfishing **/** disruption of food chain **;**	**3**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(a)</td><td>testis / testes ;
ovary / ovaries ;</td><td>2</td><td></td></tr>
<tr><td>6(b)(i)</td><td>P egg cell / ovum / ova ;
Q sperm ;
S zygote / fertilised egg cell ;</td><td>3</td><td></td></tr>
<tr><td>6(b)(ii)</td><td>P X ;
Q X ;
S XX ;</td><td>3</td><td></td></tr>
<tr><td>6(b)(iii)</td><td>R fertilisation ;
T mitosis ;</td><td>2</td><td></td></tr>
<tr><td>6(b)(iv)</td><td>uterus ;</td><td>1</td><td></td></tr>
<tr><td>6(c)</td><td><table><tr><th>method</th><th>example</th></tr><tr><td>natural</td><td>abstinence / monitoring body temperature / testing cervical mucus ;</td></tr><tr><td>barrier</td><td>condom / femidom / diaphragm ;</td></tr><tr><td>chemical</td><td>IUD / IUS / (contraceptive) pill / implant / injection ;</td></tr><tr><td>surgical</td><td>vasectomy / sterilisation ;</td></tr></table>;;;;</td><td>4</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
7(a)	<table><tr><th>structure / function</th><th>arteries</th></tr><tr><td>blood at high pressure</td><td>✓ ;</td></tr><tr><td>blood towards heart</td><td></td></tr><tr><td>thick wall</td><td>✓ ;</td></tr><tr><td>narrow lumen</td><td>✓ ;</td></tr><tr><td>valves</td><td></td></tr></table>	**3**	
7(b)(i)	carries / supplies oxygen ;	**1**	
7(b)(ii)	white blood cells / phagocytes / lymphocytes ; platelets ; plasma ;	**2**	

Question	Answer	Marks	Guidance
8	<table><tr><th>number</th><th>genotype</th></tr><tr><td>1</td><td>**bb** ;</td></tr><tr><td>2</td><td>**Bb** ;</td></tr><tr><td>4</td><td>**Bb** ;</td></tr><tr><td>14</td><td>**bb** ;</td></tr></table>	**4**	