Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2022**

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 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

[Turn over

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.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.

5 ‘List rule’ guidance

For questions that require ***n*** responses (e.g. State **two** reasons …):

- The response should be read as continuous prose, even when numbered answer spaces are provided.
- Any response marked *ignore* in the mark scheme should not count towards ***n***.
- Incorrect responses should not be awarded credit but will still count towards ***n***.
- Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response.
- Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states ‘show your working’.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Mark scheme abbreviations

- **;** separates marking points
- **/** alternative responses for the same marking point
- **R** reject the response
- **A** accept the response
- **I** ignore the response
- ecf error carried forward
- AVP any valid point
- ora or reverse argument
- AW alternative wording
- underline actual word given must be used by candidate (grammatical variants excepted)
- ( ) the word / phrase in brackets is not required but sets the context

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)(i)</td><td>dichotomous (key) ;</td><td>1</td><td></td></tr>
<tr><td>1(a)(ii)</td><td><table><tr><th>name of the bird in Fig.1.1</th><th>letter of bird in the key</th></tr><tr><td>Ammodramus bairdii</td><td>E</td></tr><tr><td>Buceros rhinoceros</td><td>B</td></tr><tr><td>Pandion haliaetus</td><td>F</td></tr><tr><td>Haliaeetus leucocephalus</td><td>D</td></tr><tr><td>Rynchops niger</td><td>A</td></tr><tr><td>Recurvirostra avosetta</td><td>C</td></tr></table>;;;;;</td><td>5</td><td>6 correct = 5 marks
4 or 5 correct = 4 marks
3 correct = 3 marks
2 correct = 2 marks
1 correct = 1 mark</td></tr>
<tr><td>1(a)(iii)</td><td>feathers ;
(lay) eggs with hard shells ;
AVP ;</td><td>2</td><td></td></tr>
<tr><td>1(b)(i)</td><td>Recurvirostra ;</td><td>1</td><td></td></tr>
<tr><td>1(b)(ii)</td><td>7900(%) ;;</td><td>2</td><td>MP1 correct subtraction to give 1975 birds
MP2 correct percentage calculated</td></tr>
</table>

Question	Answer	Marks	Guidance
1(b)(iii)	*any four from :* climate change / global warming / enhanced greenhouse effect ; habitat destruction ; deforestation ; (increase in) predation / AW ; hunting / poaching / raiding or disturbing nest sites ; introduction of new (competitive) species ; disease ; lack of food / disturbing food chains ; less reproduction / infertility ; (named) pollution ; AVP ; e.g. tourism	**4**	

Question	Answer	Marks	Guidance
2(a)	**term** / **definition** dominant – an allele that is expressed if it is present genotype – genetic make-up of an organism heterozygous – having two different alleles of a particular gene phenotype – observable features of an organism (having two identical alleles of a particular gene)	**4**	one mark for each correct line **R** each additional line
2(b)	allele chromosome nucleus **;**	**1**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2(c)</td><td>
<table>
<tr><th>statement</th><th>mitosis</th><th>meiosis</th><th></th></tr>
<tr><td>a type of nuclear division</td><td>✓</td><td>✓</td><td>;</td></tr>
<tr><td>gives rise to genetically different cells</td><td></td><td>✓</td><td>;</td></tr>
<tr><td>important for the repair of damaged tissues</td><td>✓</td><td></td><td>;</td></tr>
<tr><td>needed for growth</td><td>✓</td><td></td><td>;</td></tr>
<tr><td>produces gametes</td><td></td><td>✓</td><td>;</td></tr>
<tr><td>used in asexual reproduction</td><td>✓</td><td></td><td>;</td></tr>
</table>
</td><td>6</td><td>one mark for each correct row
R each additional tick</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3(a)(i)</td><td>
<table>
<tr><th>letter from Fig. 3.1</th><th>name</th><th>function</th></tr>
<tr><td>V</td><td>sperm duct ;</td><td>carries sperm away from the testis</td></tr>
<tr><td>Z ;</td><td>urethra</td><td>carries urine and sperm out of the body</td></tr>
<tr><td>Y</td><td>penis ;</td><td>deposits sperm into the vagina</td></tr>
<tr><td>T ;</td><td>prostate gland</td><td>makes the fluid for the sperm to swim</td></tr>
<tr><td>W</td><td>scrotum</td><td>hold the testes outside of the body / keep testes cool ;</td></tr>
<tr><td>X</td><td>testis</td><td>produce, sperm / testosterone ;</td></tr>
</table>
</td><td>6</td><td></td></tr>
<tr><td>3(b)(i)</td><td>
<table>
<tr><td>L</td><td>M</td><td>K ;</td><td>J ;</td><td>H</td><td>G ;</td></tr>
</table>
</td><td>3</td><td>one mark M then K after L
one mark J in middle
one mark H then G at the end</td></tr>
<tr><td>3(b)(ii)</td><td>X or Y ;</td><td>1</td><td></td></tr>
<tr><td>3(c)(i)</td><td>testosterone ;</td><td>1</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
3(c)(ii)	breasts develop deepening of the voice ✓ ; growth of facial and pubic hair ✓; menstruation begins muscular development ✓; pelvis widens	3	**R** each additional tick

Question	Answer	Marks	Guidance
4(a)(i)	*any two from:* all / 6 or 7, nutrients / components **;** (nutrients in) correct, proportions / amounts **;** idea of, appropriate energy requirements / AW **;**	**2**	
4(a)(ii)	cheese **;** vegetable oil **;**	**2**	**R** each additional circle
4(a)(iii)	obesity **;** coronary heart disease / CHD **;** AVP **;**	**2**	

Question	Answer	Marks	Guidance
4(a)(iv)	carbohydrate ; release energy / respiration ; OR protein ; for, cell division / growth / correct function of a (named) protein / to make more proteins / source of amino acids / antibodies / ref to immune system ; OR (named) vitamin ; to prevent (named) deficiency disease / correct function of a named vitamin ; OR (named) mineral ; to prevent (named) deficiency disease / correct named function of a named mineral ; OR water ; to keep us hydrated / for chemical reactions in cells / solvent ; OR fibre ; keep the digestive system working / speed up egestion / prevents constipation / aids peristalsis / bulking up stools / AW ;	**4**	each nutrient must be linked to correct function

Question	Answer	Marks	Guidance
4(b)(i)	teenage males **;**	**1**	
4(b)(ii)	2.6 (MJ) **;**	**1**	
4(b)(iii)	males have greater energy requirements (than females) (in all age groups) / AW **;**	**1**	
4(b)(iv)	*any one from:* to grow the fetus / AW **;** they have more mass / AW **;**	**1**	
5(a)(i)	Aerobic respiration involves enzymes. **;** only occurs in animals produces carbon dioxide and water. **;** produces lactic acid. requires chlorophyll. uses glucose and oxygen. **;**	**3**	one mark for each correct line **R** each additional line
5(a)(ii)	more **;**	**1**	

Question	Answer	Marks	Guidance
5(a)(iii)	anaerobic / fermentation ; produces, alcohol / ethanol ; produces carbon dioxide ; *used in:* bread-making ; brewing / named product of brewing ; (bio)fuels ; disinfectants / AW ; AVP ;	**3**	
5(b)(i)	11 / 12 (breaths per minute) ;	**1**	
5(b)(ii)	0.5 / 0.6 (dm^3) ;	**1**	
5(b)(iii)	greater, amplitude / volume ; greater frequency ;	**2**	
5(c)	a substance taken into the body ; that, modifies / affects, (chemical) reactions (in the body) ;	**2**	

Question	Answer	Marks	Guidance
6(a)(i)	palisade mesophyll cell labelled correctly ; vacuole labelled correctly ;	**2**	
6(a)(ii)	high(er) (concentration to a) low(er) ; (concentration by) random (movement.) ;	**2**	
6(a)(iii)	oxygen ;	**1**	
6(a)(iv)	(cell) membrane / (cell) wall ;	**1**	
6(b)(i)	10 (cm) ;	**1**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(b)(ii)</td><td>increase (rate) ;</td><td>1</td><td></td></tr>
<tr><td>6(b)(iii)</td><td>increase (rate) ;</td><td>1</td><td></td></tr>
<tr><td>6(c)(i)</td><td>starch ;
cellulose ;</td><td>2</td><td></td></tr>
<tr><td>6(c)(ii)</td><td><table><tr><th>glucose</th><th>protein</th></tr><tr><td>carbon
hydrogen
oxygen ;</td><td>carbon
hydrogen
oxygen
nitrogen ;</td></tr></table></td><td>2</td><td>one mark for correct elements in glucose
one mark for correct elements in protein
R additional elements in each list</td></tr>
</table>