Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2020**

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 2020 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.

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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.

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.

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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.

Abbreviations used in the Mark Scheme

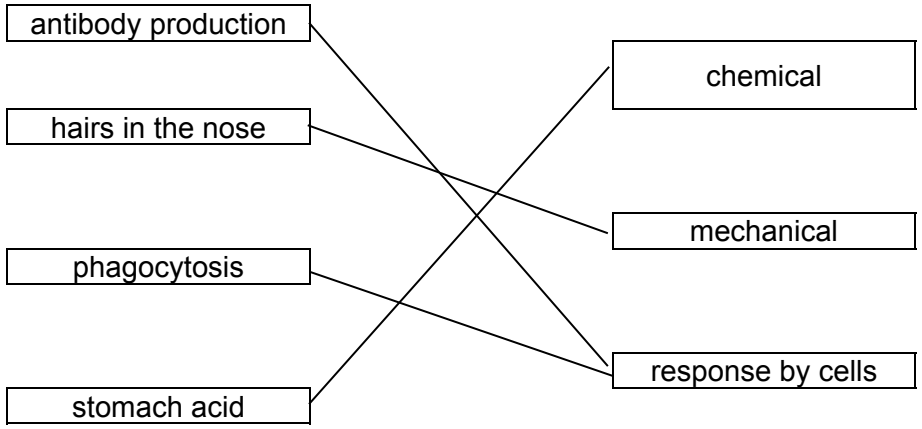
- **;** separates marking points
- / separates alternatives within a marking point
- **R** reject
- **I** mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- AW alternative wording (accept other ways of expressing the same idea)
- underline words underlined (or grammatical variants of them) must be present
- max indicates the maximum number of marks that can be awarded
- ecf credit a correct statement that follows a previous wrong response
- ( ) the word / phrase in brackets is not required, but sets the context
- **ora** or reverse argument
- AVP any valid point

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Question	Answer	Marks	Guidance
1(a)	nucleus labelled ; (cell) membrane labelled ; cytoplasm labelled ;	**3**	
1(b)	*any two from:* cell wall ; chloroplast ; (permanent) vacuole ;	**2**	

Question	Answer	Marks	Guidance
2(a)	*any two from:* jointed legs ; segmented body ; exoskeleton ; antennae ;	**2**	
2(b)	*Homarus* ;	**1**	
2(c)	*any two from:* arachnid ; insect ; myriapod ;	**2**	
2(d)	*any three from*: habitat / environment / AW, is destroyed ; an increase in predation ; ref. to disruption of, food chains / webs ; pollution / waste / plastic / rubbish / sewage / AW ; diseases ; climate change / warming of oceans / acidification of oceans / AW ; hunting / (over) fishing ; competition from other species ; AVP ; e.g. effects of tourism	**3**	

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Question	Answer	Marks	Guidance
3(a)(i)	**A ;**	**1**	
3(a)(ii)	3.3 **;;**	**2**	MP1 for correct calculation MP2 for correct answer rounded to one decimal place
3(a)(iii)	antibiotics, only kill bacteria / do not kill viruses **;**	**1**	
3(b)	disease **;** blood **;** food **;**	**3**	
3(c)	 **;;;;**	**4**	**R** each additional line drawn
3(d)(i)	obesity ticked **;** scurvy ticked **;**	**2**	**R** each additional tick

Question	Answer	Marks	Guidance
3(d)(ii)	*any three from:* stress ; smoking ; ref. to diet / high cholesterol / obesity ; genetic predisposition ; age ; sex ; AVP ;;; e.g. lack of exercise / high blood pressure / diabetes	**3**	**A** high, fat / salt

Question	Answer	Marks	Guidance
4(a)(i)	the shoot grows towards the light / AW ;	**1**	
4(a)(ii)	phototropism ;	**1**	
4(a)(iii)	to get more light ; light needed for photosynthesis / light needed to produce food / AW ;	**2**	
4(b)(i)	(movement of particles) through a cell membrane ; from a region of lower concentration to a region of higher concentration / against a concentration gradient ; using <u>energy</u> (from respiration) ;	**3**	**A** ATP
4(b)(ii)	*magnesium ions:* to make chlorophyll ; *nitrate ions:* to make amino acids ;	**2**	
4(c)	photosynthesis ; support ; transport ; as a solvent ; AVP ; e.g. transpiration / cooling	**2**	

Question	Answer	Marks	Guidance
5(a)	increased / AW **;** paper **;** plastic **;** metal **;**	**4**	
5(b)	18(%) **;**	**1**	

Question	Answer	Marks	Guidance
6(a)(i)	5.0 **;** this is the pH where the largest volume of apple juice is produced / AW **;**	**2**	
6(a)(ii)	temperature / concentration OR volume OR amount of enzyme / surface area (of apple) / **AVP ;**	**1**	
6(b)	Enzymes are living organisms. are proteins. can only be used once. have a complementary shape to their substrate. increase the rate of chemical reactions. in the stomach are most active at pH 8. **;;;**	**3**	one mark per correct line **R** each additional line
6(c)	washing powder / AVP **;**	**1**	
6(d)	*any two from:* lipase / amylase / protease / AVP **;;**	**2**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7(a)(i)</td><td>B ;
C ;
A ;</td><td>3</td><td></td></tr>
<tr><td>7(a)(ii)</td><td>X drawn on an ovule ;</td><td>1</td><td></td></tr>
<tr><td>7(a)(iii)</td><td>sepal ;</td><td>1</td><td></td></tr>
<tr><td>7(b)</td><td>any two from:
larger ;
heavier ;
stickier ;
spiky ;
AVP ;</td><td>2</td><td></td></tr>
<tr><td>7(c)</td><td>zygote circled ;</td><td>1</td><td></td></tr>
<tr><td>7(d)</td><td><table><tr><th>features of reproduction</th><th>asexual reproduction</th><th>sexual reproduction</th></tr><tr><td>involves gametes</td><td></td><td>✓</td></tr><tr><td>makes more of the same kind of organism</td><td>✓</td><td>✓</td></tr><tr><td>produces genetically identical offspring</td><td>✓</td><td></td></tr><tr><td>involves fertilisation</td><td></td><td>✓</td></tr></table>;;;;</td><td>4</td><td>one mark for each correct row</td></tr>
</table>

Question	Answer	Marks	Guidance
8(a)	<table><tr><td colspan="2"></td><td colspan="2">male parent chromosomes</td></tr><tr><td colspan="2"></td><td>**X**</td><td>**Y**</td></tr><tr><td rowspan="2">female parent chromosomes</td><td>**X**</td><td>**XX**</td><td>**XY**</td></tr><tr><td>**X ;**</td><td>**XX**</td><td>**XY ;**</td></tr></table>	**2**	MP1 correct female parent chromosome MP2 four correct offspring ecf MP2 from incorrect MP1
8(b)	50 circled **;**	**1**	
8(c)	nucleus **;**	**1**	
8(d)(i)	28(°C) **;**	**1**	
8(d)(ii)	*any three from*: increasing the temperature increases the percentage (of female offspring) / colder temperatures favour male offspring **;** percentage of female offspring is constant at, lowest / highest, temperatures **;** steepest increase at 29 °C **;** equal numbers of male and female at 29 °C **;** at all temperatures there are some, males / females **;** comparative data quote with units **;**	**3**	

Question	Answer	Marks	Guidance
9(a)	*any three from*: creates (named) pollution **;** increases the risk of spread of, pathogens / disease **;** increased use of antibiotics / ref. to antibiotic resistance **;** disturbance to, (natural) food chains / webs **;** loss of habitat **;** livestock producing (named) greenhouse gases **;** **AVP ;;** animal welfare issues / fish escaping and breeding with wild fish	**3**	
9(b)	(a sustainable resource) is produced as rapidly as it is removed (from the environment) **;** so that it does not run out **;**	**2**	
9(c)	fish stocks AND forests circled **;**	**1**	