Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/42**

Paper 4 Theory (Extended) **March 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 March 2020 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.

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.

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5 'List rule' guidance (see examples below)

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.

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mark scheme abbreviations

- **;** separates marking points
- / alternatives
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- **I** ignore as irrelevant
- **AW** alternative wording (where responses vary more than usual)
- **AVP** alternative valid point
- **ora** or reverse argument
- underline actual word given must be used by candidate (grammatical variants excepted)

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Question	Answer	Marks	Guidance
1(a)(i)	**A** – bronchus **;** **B** – trachea **;** **C** – diaphragm **;**	**3**	
1(a)(ii)	**1** diaphragm, contracts / flattens **;** **2** external intercostal muscles contract **;** **3** ribs move, upwards / outwards **;** **4** volume, increases **;** **5** pressure, decreases **;** **6** air enters (the, mouth / trachea / lungs,) to equalise the pressure **;**	**4**	
1(b)(i)	86 / 44184 × 100 = 0.194 **;** 0.19 (%) **;**	**2**	
1(b)(ii)	*idea that* non-smokers / passive smokers / AW, can die from / can develop lung cancer **;** the greater the exposure to tobacco smoke the greater the risk (of dying from lung cancer) **;** comparative data quote **;**	**3**	
1(b)(iii)	COPD **;** CHD **;** AVP **;;**	**2**	apply list rule

Question	Answer	Marks	Guidance
2(a)(i)	<table><tr><th>letter on Fig. 2.1</th><th>name of the fluid</th><th>contains red blood cells</th></tr><tr><td>A</td><td>lymph</td><td>no</td></tr><tr><td>B</td><td>tissue</td><td>no</td></tr></table> ;;	**2**	1 mark for each correct column
2(a)(ii)	diffusion ;	**1**	
2(a)(iii)	(aerobic) respiration ; for the release of energy ; for a (named) metabolic process ;	**2**	
2(b)	**1** deliver / supplies, blood / oxygen / glucose (from arteries) to, capillaries / shunt vessels ; **2** controls blood flow, through capillaries / to the surface of the skin ; **3** by vasoconstriction / vasodilation ; **4** ref to (arteriole) muscle contraction / relaxation ; **5** ref to maintenance of body temperature / homeostasis / description of ;	**3**	
2(c)	contains lymphocytes (which produce antibodies) ; filters the lymph ; ref. to immunity / defends against disease / ref. to destruction of (named) pathogens ;	**2**	**A** stores **I** produces
2(d)(i)	small intestine / villi ;	**1**	
2(d)(ii)	fat, absorption / transport ;	**1**	

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Question	Answer	Marks	Guidance
3(a)	as the ability to detect or sense stimuli in the internal or external environment ; and to make appropriate responses ;	**2**	
3(b)	eye and skin ; AVP ;	**1**	apply list rule
3(c)(i)	as a control / for a comparison / AW ; to see if blood glucose (concentration) was affected by an injection ; so there is no effect, on water potential / osmotic effect ;	**2**	
3(c)(ii)	(before the injection) blood glucose was decreasing ; *after the injection:* peaks at 4.75 mmol per dm^3 ; increase is immediate / steep (after injection of adrenaline) ; less steep / gradual, decrease after peak ; decreases below initial starting value / below 4.4 or 4.5 mmol per dm^3 / decreases to 3.9 mmol per dm^3 ; *blood glucose increases* converts <u>glycogen</u> to glucose ; in the liver ; *blood glucose decreases* glucose used in respiration ; AVP ;; e.g. insulin causes blood glucose concentration to decrease / glucagon causes the blood glucose concentration to increase	**5**	
3(d)	line sketched on the graph showing an increase ; increase starts after 2 hours ;	**2**	

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Question	Answer	Marks	Guidance
3(e)	*any two from:* widened / dilated pupils **;** increased, pulse / heart, rate **;** increased breathing rate **;** increased blood pressure **;** AVP **;;**	**2**	apply list rule

Question	Answer	Marks	Guidance
4(a)	*similarities, max 3 from:* both caused by protein (energy) deficiency **;** both types of malnutrition / <u>deficiency disease</u> / caused by lack of a balanced diet **;** primarily affects children **;** diarrhoea **;** low body mass / weight loss **;** poor growth **;** irritability / tiredness **;** wastage of muscles **;** dry skin / brittle nails **;** brittle hair / change of hair colour **;** fatty liver **;** anaemia **;** AVP **;** *differences:* kwashiorkor has water retention / oedema / swelling of body parts / pot belly **;** people suffering marasmus **also** deficient in, carbohydrates / fats / calories / energy **;** AVP **;**	**4**	

Question	Answer	Marks	Guidance
4(b)(i)	18 (%) ;;;	3	MP1 selection of correct data i.e. 1419 and 1161 MP2 correct calculation MP3 correct rounding to whole number
4(b)(ii)	any year between 1990 and 1994 or from 2000 onwards ; the number of children admitted to hospital decreases (after this year) ;	2	
4(b)(iii)	**1** (described) hygienic food prep methods ; **2** washing hands / hand sanitisers ; **3** (description of use of) clean equipment ; **4** use of clean / boiled water / filtered water / pure water ; **5** (described examples of) disposal of waste correctly / *idea of* where defaecation occurs / defaecation in a toilet ; **6** monitor or identify infective individuals; **7** isolate infected individuals ; **8** AVP ;	3	

Question	Answer	Marks	Guidance
5(a)(i)	doubles ;	1	**A** increases
5(a)(ii)	34–39 minutes ;	1	**A** any value within this range
5(b)	are genetically different (from each other and the parent cells) ; (produce) haploid (nuclei) ; ref. to reduction division / chromosome number being halved ;	3	
5(c)	ref. to unspecialised cells ; that can become specialised ; ref. to expression of genes in specialised cells ; AVP ; e.g. continually divide	2	

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Question	Answer	Marks	Guidance
5(d)	breaking of the amniotic sac ; amniotic fluid is released ; contraction of (the muscles in the) uterus (wall) ; dilation of the cervix ; passage through the vagina ; (tying and) cutting the umbilical cord ; delivery of the afterbirth / placenta ; AVP ;	**6**	

Question	Answer	Marks	Guidance
6(a)(i)	1994 / 1995 / 1996 / 1997 / 2007 ;	**1**	
6(a)(ii)	at least a 5 year period between 1975 and 1983 ;	**1**	
6(a)(iii)	increased predation ; introduced species / new predators ; reduction in food supply ; overfishing / increase in fishing ; parasites / disease ; named examples of pollution / eutrophication ; global warming / climate change / ocean acidification ; AVP ;	**3**	
6(a)(iv)	(captive) breeding programmes ; release them (into the wild / into protected areas) ; protected areas; monitoring of numbers ; limited fishing (so that wild stocks can recover) ; using farmed fish / sustainable fish (so wild stocks can recover) ; AVP ;	**3**	

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Question	Answer	Marks	Guidance
6(b)(i)	sharp / large teeth **;** lots of teeth **;** big jaws **;** streamlined **;** camouflaged **;** AVP **;**	**2**	apply list rule
6(b)(ii)	1 variation (in eyesight) ; 2 ref. to mutation ; 3 new alleles arise that increases fitness ; 4 (organisms with better eyesight) are better competitors ; 5 organisms with the good eyesight / feature, are more likely to survive and reproduce ; ora 6 passing on their alleles (for good eyesight) ; 7 eventually all the organisms (in the population) will have the feature / good eyesight ; 8 ref to natural selection / evolution **;**	**5**	

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