CAMBRIDGE
International Education

Cambridge IGCSE™

BIOLOGY **0610/32**

Paper 3 Theory (Core) **February/March 2024**

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.

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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 descriptions 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	<u>'List rule' guidance</u> 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.

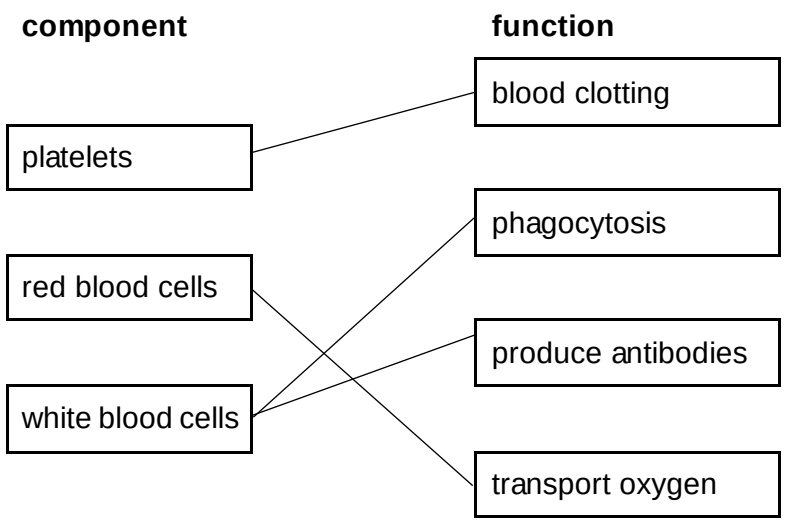
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6	<u>Calculation specific guidance</u> Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'. For questions in which the number of significant 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	<u>Guidance for chemical equations</u> 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

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Question	Answer	Marks	Guidance
1(a)(i)	 ;;;;	**4**	one mark for each correct line **R** each additional line
1(a)(ii)	transport ; *any one from:* (named) blood cell ; (named) nutrient ; (named) vitamin(s) ; (mineral) ions / named ion ; (named) hormone ; water ; carbon dioxide ; urea ; AVP ;	**2**	e.g. cholesterol / heat / (plasma) proteins
1(b)(i)	white blood cell / any named white blood cell ;	**1**	

Question	Answer	Marks	Guidance
1(b)(ii)	**A** (cell) membrane **;** **B** nucleus **;** **C** mitochondrion **;**	**3**	
1(b)(iii)	*any one from:* 1 medium for cell reactions / site of chemical reactions / AW **;** 2 solvent (for many substances) **;** 3 supports (the cell) / maintains organelles in position / maintains optimum environment for organelles / AW **;** 4 protects cell structures **;** 5 storage site **;** 6 AVP **;**	**1**	

Question	Answer	Marks	Guidance
2(a)	binomial **;** genus **;** species **;**	**3**	
2(b)	(group of) organisms **;** (reproduce to give) fertile offspring **;**	**2**	
2(c)	*Laurus nobilis* **F** *Cydonia oblonga* **A** *Aesculus hippocastanum* ***E*** *Fraxinus excelsior* **D** *Ilex aquifolium* **C** *Quercus robur* **B** **;;;;;**	**5**	all 6 must be correct for 5 marks 4 or 5 correct = 4 marks 3 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark

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Question	Answer	Marks	Guidance
3(a)	(A) plant has, no / low / least carbon dioxide **AND** carbon dioxide is needed for photosynthesis **;**	**1**	**R** letter B
3(b)	*any three from:* 1 iodine solution is a test for starch / AW **;** 2 photosynthesis produces, glucose / starch **;** 3 starch is stored in, leaf / plant **;** 4 (if) starch present iodine solution turns to blue-black **;**	**3**	
3(c)(i)	210 (arbitrary units) **;**	**1**	
3(c)(ii)	60 ± 5 (arbitrary units) **;**	**1**	
3(c)(iii)	3.8 / 3.9 / 4.0 (arbitrary units) **;**	**1**	
3(c)(iv)	*any two from:* 1 light (is the) energy (for the process) **;** 2 plants need light for photosynthesis **;**	**2**	
3(d)	water **;**	**1**	
3(e)	chloroplast(s) **;**	**1**	
3(f)(i)	61.6 **;;;**	**3**	use ecf from each previous step throughout MP1: correct values selected from table MP2: correct answer calculated MP3: correct rounding to three significant figures

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Question	Answer	Marks	Guidance
3(f)(ii)	Species 1 has the greatest rate of photosynthesis at 40°C. : The enzymes in species 2 denatured at 30°C. : Species 3 has the highest rate of photosynthesis at both 20°C and 30°C. : ✓ ; Species 3 has the smallest change in rate of photosynthesis between 20°C and 30°C. :	**1**	**R** more than one tick

Question	Answer	Marks	Guidance
4(a)	sense **;** tissue **;** receptor **;**	**3**	
4(b)(i)	X drawn on blind spot **;**	**1**	
4(b)(ii)	*cornea* B **;** *iris* C **;** *retina* E **;** *optic nerve* D **;**	**4**	
4(b)(iii)	iris controls how much light enters (the, pupil / eye) **;** lens focuses light onto retina **;**	**2**	

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Question	Answer	Marks	Guidance
5(a)	*quaternary consumer* wolf **;** *herbivore* rabbit / grasshopper **;** *secondary and tertiary consumer* road runner / wolf **;** *trophic level one* grass **;**	**4**	
5(b)(i)	3 horizontal rectangular blocks and pyramid shaped with widest block at the bottom / pyramid divided into 3 with horizontal lines **;** 3 species (correctly) labelled **;**	**2**	
5(b)(ii)	the Sun / sun **;**	**1**	
5(b)(iii)	*any three from:* *(road runner) population **decrease** caused by* 1 less food (fewer rabbits) available for wolves / AW **;** 2 wolves eat more road runners **;** *(road runner population) **increase** caused by* 3 (fewer rabbits) so more grass available for grasshoppers **;** 4 so more, grasshoppers / food, for road runners **;** 5 more reproduction of road runners **;**	**3**	both increase and decrease in population must be considered for 3 marks
5(c)(i)	*any two from:* 1 kill / controls / gets rid of, insects **;** 2 increases crop, yield / production / quality **;** 3 AVP **;**	**2**	

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Question	Answer	Marks	Guidance
5(c)(ii)	*any three from:* 1 deforestation / cutting down trees / habitat destruction ; 2 introduction of foreign species / named example e.g. feral cats ; 3 hunting (for sport) ; 4 catching for food / overharvesting ; 5 deliberate poisoning (of a raptor) ; 6 killed on roads / by aeroplanes ; 7 climate change / global warming ; 8 (named) pollution; 9 AVP ;	**3**	e.g. removing food sources (of hawk) / catching for pets

Question	Answer	Marks	Guidance
6(a)(i)	*any two from:* 1 increases ; 2 steady increase 2000 to 2020 ; 3 increasing rate 2020 to 2050 ; 4 appropriate comparative data quote (inc. units) ;	**2**	
6(a)(ii)	50% circled ;	**1**	
6(a)(iii)	produced as rapidly as it is removed (from the environment) ; does not run out ;	**2**	**R** can be, used more than once / recycled

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Question	Answer	Marks	Guidance
6(a)(iv)	*any three from:* 1 carbon dioxide is a pollutant **;** 2 carbon dioxide causes, (enhanced) greenhouse effect / global warming **;** 3 climate change **;** 4 rising sea levels **;** 5 more extreme weather events / example of **;** 6 habitat destruction / deforestation **;** 7 extinction of species **;** 6 AVP ***;***	**3**	
6(b)	*any three from:* 1 entanglement / cannot swim / cannot hunt / suffocate / limb damage **;** 2 (if ingested) starvation / plastic blocks digestive system / cannot digest plastic (because it is non- biodegradable) / AW **;** 3 toxic / poisonous **;** 4 blocks sunlight so reduces photosynthesis **;** 5 disrupts food chains **;** 6 accumulates up the food chain / bioaccumulates **;** 7 organisms die / number of organisms decrease **;** 8, 9 AVP **;;**	**3**	e.g. microplastics enters food chain

Question	Answer	Marks	Guidance
7(a)(i)	length of DNA / unit of DNA **;** codes for a protein / polypeptide **;**	**2**	
7(a)(ii)	decreases blood glucose concentration **;**	**1**	

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Question	Answer	Marks	Guidance
7(a)(iii)	*any one from*: *(insertion of genes into*) crop plants for resistance to herbicides **;** resistance to insect pests **;** resistance to disease **;** improved (named) nutritional qualities **;** make human proteins **;** AVP **;**	**1**	e.g. to produce antibiotics/other (named) medicines/ required chemicals / biofuels/ improve breeds of animals with desirable characteristics
7(a)(iv)	*any two from*: rapid reproduction rate **;** ability to make complex molecules **;** can be grown in a small space easily ***;***	**2**	
7(b)	*any two from*: *bacteria have:* 1 circular DNA **;** 2 plasmids **;** 3 no nucleus **;** 4 no mitochondria **;** 5 no, chloroplasts / chlorophyll **;** 6 cell wall is not cellulose based / AW **;** 7 flagella **;** 8 AVP **;**	**2**	ora if written in terms of plant cells

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