Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

BIOLOGY **5090/21**

Paper 2 Theory **October/November 2018**

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 2018 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.

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.

Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
()	contents of brackets are not required but should be implied
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
Ig	ignore (for incorrect but irrelevant responses)
AW	alternative wording (where responses vary more than usual)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
underline	actual word underlined must be used by candidate
+	statements on both sides of the **+** are needed for that mark

Question	Answer	Marks	Guidance
1(a)(i)	sexual **;**	**1**	
1(a)(ii)	pollen **+** stigma **;** pollen tube **;** style **;** ovary / ovule **;** female gamete / ovum **;** fertilisation or described **;** growth of pericarp / ovary wall **;** petals fall off / stamens **or** stigma **or** style withers **AW ;**	**5**	**Ig** self- or cross-pollination
1(b)	asexual / vegetative **;**	**1**	
1(c)	*(using flowers) maximum 2 marks from* variation **AW ;** population more likely to survive environmental change / disease **;** more widely dispersed **;** reduction of competition **;** *(using plantlets) maximum 2 marks from* quick / only one plant needed / no other organism needed **;** supply of water / nutrition from parent plant **;** higher survival rate **;** new plants in environment to which plant is well suited **AW ;**	**3**	

Question	Answer	Marks	Guidance
2(a)(i)	radicle / root ; root hairs ; plumule / shoot / stem ; leaves ; hypocotyl ;	**2**	
2(a)(ii)	*(name of process)* germination / growth ; *(use of enzymes) maximum 3 marks from* digest / breakdown / hydrolysis ; amylase ; starch **+** to maltose / glucose ; protease ; protein **+** to amino acids ; lipase ; fats **+** to fatty acids **and** glycerol ;	**4**	
2(b)	development **AW** slower / would not germinate / would not grow ; denature ; reactions / digestion / hydrolysis / breakdown **+** slow / don't occur ;	**2**	

Question	Answer	Marks	Guidance
3(a)(i)	**(A)** biceps ; **(B)** scapula / shoulder blade ; **(C)** humerus ;	**3**	
3(a)(ii)	hinge joint correctly identified ;	**1**	
3(a)(iii)	rotation / more than one plane **AW** ;	**1**	
3(b)(i)	glucose / $C_6H_{12}O_6$ **+** oxygen / $6O_2$; carbon dioxide / $6CO_2$ **+** water / $6H_2O$;	**2**	**A** a mixture of words and correct symbols
3(b)(ii)	anaerobic (respiration) / lack of oxygen ; lactic acid ;	**2**	
3(b)(iii)	(time taken) would decrease / pain quicker ; more muscle activity / muscle works hard(er) ; more energy ; more anaerobic (respiration) ; more lactic acid ;	**3**	

Question	Answer	Marks	Guidance
4(a)(i)	diaphragm **+** contracts **;** diaphragm **+** moves down **;** external intercostal muscles **+** contract **;** internal intercostal muscles **+** relax **;** ribs move **+** up / out **;**	**3**	**Ig** references to volume / pressure
4(a)(ii)	**structure D** correctly identified on trachea / bronchus **;** **structure E** identified at end of a bronchiole **;**	**2**	**A** any method of correct identification
4(b)	*(capillary) max 3 marks from* wall **+** one cell thick **;** diffusion **;** example of **named** substance **+** in / out / through wall **;** branching / network / contacts many cells / large surface area **;** *(red blood cell) max 3 marks from* biconcave **AW ;** no nucleus **;** haemoglobin **;** large surface area **;** oxygen in / out / carriage **;** able to squeeze through capillaries / flexible **;**	**5**	

Question	Answer	Marks	Guidance
5(a)	membrane or **P** / cytoplasm or **Q** / pulling away from wall **;** plasmolysed / plasmolysis / flaccid **;** water potential / concentration **+** lower outside than inside cells **ORA ;** diffusion / osmosis **;** water **+** out of cells **;** through **+** partially **AW** permeable membrane **;**	**4**	
5(b)(i)	**(P)** membrane **;** **(Q)** cytoplasm **;**	**2**	
5(b)(ii)	salt **+** water / solution **;**	**1**	
5(b)(iii)	partially **AW** permeable **;** water can pass through **;** other substances (e.g. salt) **+** cannot pass through **;**	**3**	

Question	Answer	Marks	Guidance
6(a)	*(agricultural land) max 4 marks from* insecticides / pesticides / fertilisers **;** into river / ocean / water **;** eutrophication **AW ;** contamination of drinking water **;** soil erosion / leaching / run-off **;** * burning **+** fossil fuels / named fossil fuel **;** * release of carbon dioxide / monoxide **;** * global warming / greenhouse effect **or** gas **;** * death of river **or** marine life **;** *(power station) max 4 marks from* * burning **+** fossil fuels / named fossil fuel **;** * release of carbon dioxide / monoxide **;** * global warming / greenhouse effect **or** gas **;** * death of river **or** marine life **;** release of sulfur dioxide / oxides of nitrogen **;** acid rain **;** increase in water temperature **;**	**6**	*** A** once only for agricultural land **or** power station
6(b)	reduce / recycle / re-use **;** *max 3 marks from list of examples* glass / metal / plastic / water / fishing / use of cars **or** catalytic converters / effluent / carrier bags / greenhouse emissions / fossil fuels / oil / sewage / plant trees / renewable energy **;**	**4**	**Ig** waste / refuse unqualified

Question	Answer	Marks	Guidance
7(a)(i)	oesophagus / gullet ;	**1**	
7(a)(ii)	peristalsis ; wave of / rhythmic **+** contraction ; circular muscles ; behind / pushing (food) ;	**4**	**Ig** longitudinal muscles
7(b)(i)	higher than ;	**1**	
7(b)(ii)	liver ; bile ; pancreas ; pancreatic juice / secretions / hydrogencarbonate ; bile / pancreatic juice **+** alkaline / high pH ;	**4**	**Ig** gall bladder **A** any pH above 7

Question	Answer	Marks	Guidance
8(a)	*(pH or temperature)* best / optimum / fastest **;** rate slower both sides of the optimum **;** active site **;** change in shape **;** substrate no longer fits **;** shape of curve described **;** denaturation **+** pH not optimum / high temperature **AW** **;** *(temperature only)* Increase in temperature increases rate of reaction **;** heat increases rate of molecular movement / kinetic energy **;** more collisions (at higher temperature) **;**	**7**	
8(b)	named enzyme from alimentary canal **;** correct named location for action of enzyme named **;** correct named substrate **+** product(s) for substrate named **;**	**3**	

Question	Answer	Marks	Guidance
9(a)	*(light intensity)* higher the light intensity the faster the rate of photosynthesis **ORA ;** limiting factor **;** up to a maximum **;** (light) absorbed **AW +** chlorophyll / chloroplasts **;** *(temperature)* rate of photosynthesis increases with higher temperature **ORA ;** limiting factor **;** faster molecular movement / more kinetic energy **;** enzymes **;** water loss at higher temperatures **;** water **+** photosynthesis **;** guard cells lose turgidity / closure of stomata **;** wilting **;**	**7**	
9(b)	(animals) cannot make their own food / cannot photosynthesise **AW ;** plants **+** eaten **;** digested **;** assimilated **AW ;** respiration **/** release of energy **;** use oxygen from plants **;** plants use carbon dioxide **;**	**3**	**R** energy produced