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Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/22**

Paper 2 Theory **May/June 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 May/June 2022 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.

MARK SCHEME ABBREVIATIONS

;	separates marking points
/ and **OR**	indicate alternatives within a marking point
()	the contents of brackets are **not required**
Reject	guidance for examiners concerning a point to reject
Allow	guidance for examiners concerning a point to accept
Ignore	guidance for examiners concerning a point to ignore
AW	allow alternative wording to that specified on the mark scheme
ORA	or reverse argument – i.e. the reverse argument may be accepted
underline	the word(s) underlined must be used by candidate for the award of the mark (allow grammatical variants)
ecf	allow error carried forward
max	dictates the maximum number of marks that can be awarded
+	a statement from **both** sides of the **+** is required for that mark

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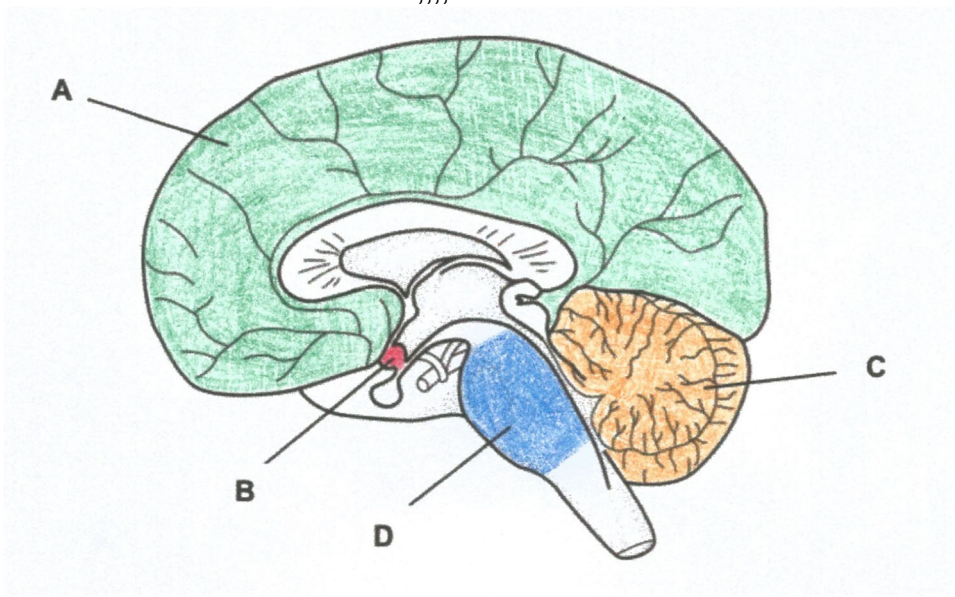
Question	Answer	Marks	Guidance
1(a)	one mark for each correct label ;;;;  	4	
1(b)(i)	**1** erector / hair **+** muscle ; **2** <u>sweat gland</u> ; **3** <u>smooth muscle</u> ; **4** blood vessel / artery / arteriole ;	1	**4 Reject** capillary

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Question	Answer	Marks	Guidance
1(b)(ii)	(erector muscle) **1** contracts ; **2** raises hair ; **3** traps air / insulation ; **4** reduces heat loss ; (sweat gland) **5** produces / secretes / releases ; **6** sweat / perspiration ; **7** evaporates ; **8** cools ; (smooth muscle / blood vessel / artery / arteriole) **9** contracts ; **10** constricts / narrows / <u>vasoconstriction</u> ; **11** less blood to **+** capillaries / surface of skin ; **12** reduces heat loss ;	**3**	**Allow** reverse argument for each marking point

Question	Answer	Marks	Guidance
2(a)(i)	falls / drops / goes down / lowers / shrinks / collapses **AW** ;	**1**	
2(a)(ii)	**1** any number between 20 and 21 ; (any two from) **2** decreases **AW** ; **3** into blood ; **4** <u>aerobic</u> **+** <u>respiration</u> ;	**3**	
2(a)(iii)	carbon dioxide / CO_2 ;	**1**	**Allow** water / H_2O / water vapour

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Question	Answer	Marks	Guidance
2(b)(i)	**1** diaphragm / external intercostal muscle **+** contracts ; **2** diaphragm **+** down / flattens **OR** ribs move **+** up / out ; **3** increase volume / decrease pressure **+** thorax / lungs ; **4** air breathed in / air into lungs / inhale ; **5** upper box falls / pen moves down ;	**3**	**2 to 5 Reject** reverse statements
2(b)(ii)	more **+** peaks / troughs / waves **OR** peaks / troughs / waves **+** closer together **OR** shorter wavelength / increased frequency of waves **AW** ;	**1**	

Question	Answer	Marks	Guidance
3(a)(i)	4.5 divided by 6 ; 0.75 ;	**2**	
3(a)(ii)	**1** respiration / fermentation ; **2** carbon dioxide ; **3** released / lost / escapes **+** from beaker / into air **AW** ;	**3**	
3(a)(iii)	**1** increase line to left of that printed **+** starting at (0,0) ; **2** levels off at 8.5 (± half a small square) max mass lost ;	**2**	
3(b)(i)	**1** amylase / maltase ; **2** digests / hydrolyses / breaks down **AW** ;	**2**	
3(b)(ii)	(40 °C) any number between 81 and 200 ; (80 °C) any number between 50 and 79 ;	**2**	

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Question	Answer	Marks	Guidance
3(b)(iii)	**1** gas / carbon dioxide **+** produced ; **2** enzyme ; **3** 20 °C **+** less kinetic energy / fewer collisions ; **4** 40 °C **+** more kinetic energy / more collisions / optimum **AW** ; **5** 80 °C **+** denatured / active site changes shape / substrate not fit active site / yeast killed ;	**3**	

Question	Answer	Marks	Guidance
4(a)(i)	liver ;	**1**	
4(a)(ii)	**1** active site ; **2** complementary / specific / lock and key / fits ; **3** binds / bonds to / combines with **AW** ; **4** enzyme-substrate complex / ES complex ;	**3**	
4(b)(i)	**1** change / alter / modify ; **2** gene structure / DNA structure / base sequence / nucleotide sequence ;	**2**	
4(b)(ii)	**1** eat less protein / eat food low in phenylalanine ; **2** eat less named protein-containing food ; **3** proteins **+** digested to / broken down to / made of **+** amino acids ;	**3**	
4(b)(iii)	**1** (gametes) H **+** h **AND** H **+** h ; **2** (offspring) HH **+** Hh **+** Hh **+** hh / correct genotypes for gametes ; **3** (probability) 25% / ¼ / 1 in 4 / 1:3 / 0.25 ;	**3**	

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Question	Answer	Marks	Guidance
5(a)	(**P**) rate of photosynthesis ; (**Q**) temperature ; (**R**) rate of transpiration ; (**S**) air humidity ;	**4**	
5(b)	**1** evaporation ; **2** surface of / cell wall / film of water / layer of water **+** mesophyll cells ; **3** water vapour ; **4** air spaces / intercellular spaces ; **5** diffusion / high to low concentration / down concentration gradient ; **6** water **+** through stomata ;	**3**	

Question	Answer	Marks	Guidance
6(a)	**1** peristalsis ; **2** muscles ; **3** antagonistic ; **4** circular **+** longitudinal ; **5** circular contract **+** at **T** / behind food **OR** circular relax **+** at **U** / in front of food ; **6** longitudinal relax **+** at **T** / behind food **OR** longitudinal contract **+** at **U** / in front of food ; **7** push / force / squeeze / narrows / constricts **AW** ; **8** wave action / rhythmic ; **9** **T** to **U** / from **T** / towards **U** / to left ; **10** mucus **+** eases movement / reduces friction **AW** ;	**7**	

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Question	Answer	Marks	Guidance
6(b)	(component) fibre / roughage / cellulose ; (source) potatoes / brown rice / brown bread / wholewheat pasta / fruit / vegetables / named fruit or vegetable / any other correct ; (effect) constipation **AW OR** bowel / colon **+** cancer ;	**3**	

Question	Answer	Marks	Guidance
7(a)	(mark both sections as one complete response) **1** named enzyme ; **2** substrate named for enzyme that has been named in marking point **1** ; **3** glucose / amino acids / fatty acids and glycerol **+** produced ; **4** respiration **+** energy released ; **5** enzymes used in respiration ; **6** protein synthesis ; **7** mitosis ; **8** production of genetically **+** identical cells **OR** clones ; **9** growth / new protoplasm / new organelles ; **10** radicle **+** plumule ;	**7**	
7(b)	**1** light ; **2** chloroplasts / chlorophyll ; **3** photosynthesis ; **4** produce **+** carbohydrate / glucose / starch ;	**3**	

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Question	Answer	Marks	Guidance
8(a)	**1** both carry deoxygenated blood ; **2** blood in pulmonary artery <u>from</u> **+** heart / right ventricle ; **3** blood in vena cava <u>from</u> body ; **4** blood in pulmonary artery <u>to</u> lungs ; **5** blood in vena cava <u>to</u> **+** heart / right atrium ; } (any two from) 3 **6** vena cava **+** vein ; **7** vena cava **+** valve / valves ; **8** pulmonary artery **+** thick <u>wall</u> / muscular <u>wall</u> / elastic <u>wall</u> ; **9** pulmonary artery **+** narrow lumen / small lumen ; **10** pulmonary artery **+** high pressure ;	**6**	**7 Allow** reverse for pulmonary artery **8 9 10 Allow** reverse for vena cava
8(b)	**1** <u>blood</u> **+** <u>clotting</u> ; **2** fibrinogen **+** to fibrin ; **3** soluble **+** to insoluble **OR** forms **+** threads / a mesh ; **4** prevents **+** blood loss **AW** ; **5** prevents **+** <u>infection</u> / entry of pathogens **AW** / entry of named type of pathogen ;	**4**	

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Question	Answer	Marks	Guidance
9(a)	**1** both carry **+** urine / urea ; **2** ureter from kidney ; **3** ureter to bladder ; **4** urethra from bladder **5** urethra out of body ; } (any two from) **6** male / penis / testis **+** urethra carries **+** semen / sperm ;	**4**	
9(b)	**1** selectively / partially / semi **+** permeable ; **2** large surface area ; **3** fluid / dialysate ; **4** counter-current / continuously changed ; **5** urea / toxins / poisons / harmful substances **+** from blood / to fluid ; **6** water / salts / ions **+** between blood and fluid ; **7** diffusion / osmosis ; **8** high to low concentration / down concentration gradient ; **9** large molecules / proteins **+** stay in blood / do not enter fluid ;	**6**	

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