Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

BIOLOGY **5090/22**

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.

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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 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

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Question	Answer	Marks	Guidance
1(a)(i)	(Fig. 1) artery / arteriole / named artery ; (Fig. 2) vein / venule / named vein ;	**2**	
1(a)(ii)	reference to size / shape **+** lumen **AW** ; reference to size of wall / muscle / elastic ;	**2**	
1(b)(i)	two structures drawn toward lumen from similar height on opposite walls ; all structures drawn point upwards ;	**2**	
1(b)(ii)	open / close **OR** action of valve flaps described ; prevent back-flow of blood **OR** blood in one direction ; from lower regions of body ; low pressure ;	**2**	

Question	Answer	Marks	Guidance
2(a)(i)	**(E)** urethra ; **(F)** bladder ; **(G)** kidney ; **(H)** ureter ;	**4**	**R** gall (bladder)
2(a)(ii)	semen / seminal fluid / sperm / gametes **+** carried by **E** / not carried by **H** ;	**1**	
2(b)(i)	(contains) glucose ;	**1**	
2(b)(ii)	insulin gene ; from **+** human **+** DNA / chromosome / genome ; to **+** bacterial **+** DNA / chromosome / genome / plasmid ; fermenter ; reproduce / multiply / divide / mitosis / binary fission ;	**4**	**Ig** fermentation

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Question	Answer	Marks	Guidance
3(a)(i)	3 ;	1	**R** 3%
3(a)(ii)	some may not germinate / some may not produce a pollen tube ; accuracy / precision / reliability / validity / reduce error ;	1	
3(a)(iii)	8 ; highest **AW +** % / number ; highest **AW +** length **OR** longest ;	3	
3(a)(iv)	water **+** concentration / potential ; less / no **+** water enters **OR** water leaves ; osmosis / diffusion ;	3	
3(b)	stigma ; style ; ovary / ovule / ovum / embryo sac / female gamete ; movement of **AW +** male gamete / male nucleus / pollen nucleus ; fertilisation / fusion of gametes ;	4	

Question	Answer	Marks	Guidance
4(a)(i)	carbon dioxide **+** falls / lower **+** during day ; carbon dioxide **+** rises / higher **+** at night ; respiration **+** during day and night ; respiration **+** produces / releases **+** carbon dioxide ; photosynthesis **+** during day / not at night ; photosynthesis **+** uses / absorbs **+** carbon dioxide ; photosynthesis faster than respiration during day ;	4	
4(a)(ii)	line starts at y-axis **+** spans all time axis ; any line lower **+** then rising above **+** then falling below existing line ;	2	

Question	Answer	Marks	Guidance
4(b)	midday circled ; less / low **+** carbon dioxide ; pH **+** increases / high / above 7 **OR** alkali ; more ammonia **AW** ;	**4**	

Question	Answer	Marks	Guidance
5(a)	*(FSH)* follicle / egg / ovum **+** develops / matures / grows ; ovary ; oestrogen **+** production / release ; *(progesterone)* maintains **AW** uterus **+** lining / wall ; implantation / pregnancy ; stops LH/FSH **+** production / release ;	**4**	
5(b)(i)	fertile ; sperm in **+** female / vagina / uterus / oviduct / fallopian tube ; sperm survive **+** several days / until ovulation **AW** / until day 14 ;	**2**	
5(b)(ii)	*(name of method)* natural / rhythm / calendar ; *(explanation)* have intercourse outside fertile phase / avoid intercourse in fertile phase ; no sperm present **+** at same time as egg / at ovulation / on day 14 ; no fertilisation / no fusion of gametes ;	**3**	
5(b)(iii)	cycles / periods **AW +** irregular / vary in length ; fertile phase / ovulation **+** on different days ; data / chart / information **+** not be available ; sperm may survive for a long time **AW** ;	**1**	

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Question	Answer	Marks	Guidance
6(a)	rise in population ; any named human invention requiring an energy supply ; burning / combustion ; fossil fuels / coal / oil / gas ; production / release **+** of carbon dioxide ; deforestation / fewer trees / fewer plants ; less / no **+** absorption / uptake / use **+** of carbon dioxide ; less / no **+** photosynthesis ; decomposition / decay ; respiration ;	**5**	
6(b)	greenhouse **+** gas / effect ; global warming ; *any three further marks from:* • extreme weather **AW** / flood / drought / storms **AW** / heat waves ; • loss of **+** homes / habitat / life / crops / land / soil / food / income ; • ice melting ; • rise in sea levels ; • migration ; • invasive species more successful ; • extinction ; • water **AW +** warms / changed currents / acidified / oxygen depletion ; • changed distribution **+** disease / vectors of disease (e.g. mosquito) ;	**5**	

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7(a)(i)</td><td>decomposition / decay / rotting ;</td><td>1</td><td></td></tr>
<tr><td>7(a)(ii)</td><td>bacteria ;
fungi ;
enzyme ;
digest / breakdown / hydrolysis ;

any two further marks from:
• starch + to maltose / glucose ;
• maltose + to glucose ;
• protein + to amino acids ;
• lipid + to glycerol and fatty acids ;</td><td>5</td><td></td></tr>
<tr><td>7(b)</td><td>1 fertiliser / fertile / nutrients ;
2 ions / named ion OR mineral + salts ;
3 in soil / recycled / carbon cycle / nitrogen cycle ;
4 into AW + plant / root ;
5 diffusion / active transport OR down / against + conc. gradient ;
6 see guidance column ;
7 carbon dioxide + produced / released ;
8 plant uses carbon dioxide for photosynthesis ;
9 growth ;</td><td>4</td><td>Allow for point 6 any one from:
<table><tr><td>nitrates</td><td>+ amino acids / protein ;</td></tr><tr><td>magnesium</td><td>+ chlorophyll ;</td></tr><tr><td>phosphate</td><td>+ DNA / membranes ;</td></tr><tr><td>sulfate</td><td>+ amino acids / proteins ;</td></tr><tr><td>calcium</td><td>+ cell walls ;</td></tr><tr><td>iron</td><td>+ chlorophyll ;</td></tr><tr><td>potassium</td><td>+ enzymes ;</td></tr><tr><td>ammonium</td><td>+ amino acids / protein ;</td></tr></table></td></tr>
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Question	Answer	Marks	Guidance
8(a)	*(discontinuous)* idea of few **+** phenotypes / categories **AW OR** no intermediates **;** inherited / passed to next generation **;** genes / genetic / genotype / alleles **;** correct example (e.g. blood group, eye colour, sex, ear lobes, tongue roll) **;** bar chart / bar graph **;** *(continuous)* idea of many **+** phenotypes / categories **AW OR** intermediates / range **;** genes / genetic / genotype / alleles **+** environment **;** any named environmental factor (e.g. diet / sunlight exposure) **;** correct example (e.g. skin colour / hair colour / height / weight) **;** normal distribution **;**	**7**	
8(b)	DNA / deoxyribonucleic acid **;** chromosomes / genes / alleles **;** copied / replicated **;** passed to next generation / from parents **;** gametes / egg / sperm **;**	**3**	

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Question	Answer	Marks	Guidance
9(a)	*(diffusion)* **1** movement **+** particles / molecules / ions **;** **2** down concentration gradient / from high to low concentration **;** **3** named molecule or ion **;** **4** **(ONLY if point 3 awarded)** context for example named in point **3 ;** *(active transport)* **5** movement **+** particles / molecules / ions **;** **6** against concentration gradient / from low to high concentration **;** **7** energy **;** **8** respiration **;** **9** membrane / carrier proteins **;** **10** named molecule or ion moved by active transport **;** **11** **(ONLY if point 10 awarded)** context for example named in point **10 ;**	**7**	e.g. oxygen / carbon dioxide / glucose e.g. out of blood / into leaf / into villi e.g. nitrate ion / glucose e.g. into root hair / into villi
9(b)	*points referring to why starch is more suitable:* insoluble **;** molecule **+** large / compact / complex **OR** polysaccharide **;** remains inside cell / cannot cross membrane / grains **;** does not change water potential inside cell **;** prevents gain of water by cells **;** osmosis **OR** diffusion **+** water **;**	**3**	**A** reverse argument for all points if reference made to why glucose would be less suitable

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