Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/42**

Paper 4 Theory (Extended) **March 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.

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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.

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Mark schemes will use these abbreviations

- ; separates marking points
- / alternatives
- **I** ignore
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- AVP any valid point
- ecf credit a correct statement / calculation that follows a previous wrong response
- **ora** or reverse argument
- ( ) the word / phrase in brackets is not required, but sets the context
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given

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Question	Answer	Marks	Guidance
1(a)(i)	*each row in this order:* **F A E** **C B D** **;;;;;**	**5**	6 correct = 5 marks 4/5 correct = 4 marks 3 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark
1(a)(ii)	prokaryote **;**	**1**	
1(b)	presence of genetic material / DNA / RNA **;** presence of protein **;**	**1**	
1(c)(i)	(actual length of bacterium) = size / length, of the image ÷ magnification **;**	**1**	
1(c)(ii)	2.6 (µm) **;**	**1**	
1(d)(i)	**1** produces a toxin **;** **2** bacteria / toxin, attach to the wall of the, small / large, intestine **;** **3** correct ref to chloride ions **;** **4** secretion / loss, chloride ions, into the, small intestine **;** **5** causing a water potential gradient / water potential of the intestinal lumen is lowered **;** **6** causing osmotic movement of water into the gut / water flows from, the cells / blood, into the, lumen / gut **;** **7** loss of salts from the blood **;** **8** causing, diarrhoea / dehydration **;**	**4**	
1(d)(ii)	oral rehydration (therapy / salts / treatment / solution) **;** in-take of water, sugar and, salt / ions **;** antibiotics **;**	**1**	

Question	Answer	Marks	Guidance
2(a)	*describe and compare* **1** COPD higher in villages than cities **; ora** **2** COPD increasing in both areas **;** **3** increasing more rapidly in villages **;** **4** fluctuation / COPD decreases, in cities in 2001 **;** **5** data quote comparing villages and cities including year and million **;** *suggest* **6** lack of healthcare in villages **;** **7** more people smoke in villages / passive smoking **;** **8** lack of awareness / education, in villages **;** **9** pollution in villages **;** **10** poor quality housing in villages **;** **11** differences in diet **;** **12** AVP **;** e.g. lack of physical activity **;**	**6**	
2(b)(i)	**1** nasal hairs, trap particles / AW **;** **2** goblet cells secrete mucus **;** **3** particles trapped in the mucus **;** **4** cilia moving the mucus **;** **5** mucus (containing particles) moved, away from the gas exchange surface / towards the throat / AW **;** **6** mucus, swallowed / AW **;** **7** AVP **;** phagocytes / sneezing	**4**	
2(b)(ii)	more oxygen **;** less carbon dioxide **;** less water vapour **;**	**2**	
2(c)(i)	intercostal **;**	**1**	
2(c)(ii)	(pressure) decreases and (volume) increases **;**	**1**	

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Question	Answer	Marks	Guidance
3(a)(i)	0.2 ;	**1**	
3(a)(ii)	pyramid shape with four trophic levels widest at the bottom ; bars drawn at correct width (± half a small square) ; each bar labelled with trophic level ;	**3**	**A** ecf from part **(i)**
3(b)	decomposer ;	**1**	
3(c)(i)	photosynthesis ; ref. to chlorophyll ; light energy is transferred to chemical energy ; (named) glucose formed (from carbon dioxide and water) ; named example of carbohydrate molecule used to make biomass ;	**3**	e.g. cellulose, sucrose, starch, protein, DNA, tissues
3(c)(ii)	energy is lost between the trophic levels / energy decreases up the trophic levels ; not all of the organism is, eaten / digested / absorbed ; energy is lost, as heat / in respiration / in metabolic processes / named metabolic process / movement ; energy lost in, excretion / faeces / urine ; (so) less energy to support the next trophic level ;	**3**	
3(d)	**1** prevents extinction / protection of endangered species ; **2** maintains genetic diversity / biodiversity / AW ; **3** maintaining habitat / ecosystem / breeding grounds ; **4** maintain, nutrient recycling ; **5** maintain, resource provision / food / drugs ; **6** maintain, food chains / food webs / trophic levels / description of ; **7** prevent soil erosion / flooding ; **8** AVP ; as a leisure facility / tourism / education	**3**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4(a)</td><td>
<table>
<tr><th>function</th><th>letter</th><th>name</th></tr>
<tr><td>releases oestrogen</td><td>F</td><td>ovary</td></tr>
<tr><td>site of fertilisation</td><td>A</td><td>oviduct</td></tr>
<tr><td>site of implantation</td><td>E</td><td>uterus lining</td></tr>
<tr><td>dilates during the process of birth</td><td>C / D</td><td>vagina (C) / cervix (D)</td></tr>
</table>
;;;;</td><td>4</td><td>1 mark for each correct row</td></tr>
<tr><td>4(b)</td><td>23 ;
46 / 23 pairs ;</td><td>2</td><td></td></tr>
<tr><td>4(c)</td><td>1 cases increases then decrease ;
2 large increase between 10–14 and 15–19 ;
3 most cases in the 15–19 age group ;
4 from 15–19 number of cases decrease / from 20–24 number of cases steep decrease ;
5 no cases above 55 years old / in 55–64 age group / 65+ age group ;
6 data quote with number of cases and age group ;</td><td>3</td><td></td></tr>
<tr><td>4(d)(i)</td><td>antibiotics ;</td><td>1</td><td></td></tr>
<tr><td>4(d)(ii)</td><td>HIV ;</td><td>1</td><td></td></tr>
<tr><td>4(d)(iii)</td><td>(named) bodily fluids / sexual fluid ;
barrier ;
condom / femidom ;</td><td>3</td><td></td></tr>
</table>

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Question	Answer	Marks	Guidance
5(a)(i)	*advantages* **1** lower (dry) mass **;** **2** fewer weeds / lower weed density **;** **3** less competition **;** **4** therefore higher yield of crop **;** *disadvantages* **5** more treatments **;** **6** higher cost / time / effort **;** **7** idea of increased environmental impact **;** **8** increased health risks **;**	**4**	
5(a)(ii)	increased strength of wind **;** increased precipitation **;** resistance **;** type of weed **;** AVP **;;** e.g. ref. to amount / too much time between treatments	**2**	
5(a)(iii)	**1** absorbed by (broad leaved) weeds / selective for weeds **;** **2** less absorption by (narrow leaved) crops **;** **3** increase the growth (rate) of weeds **;** **4** plant cannot produce enough, glucose / photosynthesise fast enough **;** **5** weeds cannot maintain rate of growth **;** **6** AVP **;** e.g. falls over and can't absorb sunlight	**3**	
5(b)	gravi / geo **;** tropism **;**	**2**	

Question	Answer	Marks	Guidance
6(a)	breakdown of large to small molecules ; from insoluble to soluble ;	**2**	
6(b)(i)	*test-tube 1* **1** (less cloudy), slower break down of egg white solution / protein ; **2** (no HCl so) pH of the solution is too high ; **ora** **3** high pH denatures pepsin / enzyme ; *test-tube 2* **4** hydrochloric acid causes a low pH ; **5** pepsin works best in / optimal activity, low pH / acidic conditions ; *test-tube 3* **6** pepsin / enzyme, unable to break down, protein / egg white solution ; **7** boiling denatures, pepsin / enzyme ; **8** ref to enzyme-substrate complex / fewer successful collisions ; **9** high pH / boiling, changes shape of active site ;	**5**	
6(b)(ii)	as a control ; to show that pepsin is responsible for the protein digestion ; to show that hydrochloric acid does not digest the protein ;	**2**	
6(b)(iii)	stomach ;	**1**	
6(c)	maltose broken down ; to glucose ; on the membranes of the epithelial lining ; (acts) in the small intestine / duodenum ;	**3**	

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