



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

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**BIOLOGY (US)**

**0438/31**

Paper 3 Theory (Core)

**October/November 2017**

MARK SCHEME

Maximum Mark: 80

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**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.

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This document consists of **11** printed pages.

**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

Question	Answer				Marks	Guidance
1		key	name of insect	letter	4	1 correct = 1 mark 2 correct = 2 marks 3 correct = 3 marks 4 or 5 correct = 4 marks
	1 (a)	body is long and thin	go to 2			
	(b)	body is short and rounded	go to 3			
	2 (a)	body has a spotted pattern	<i>A. oculatus</i>	D		
	(b)	body has a plain pattern	<i>P. pyralis</i>	E		
	3 (a)	no visible antennae	<i>C. lunaris</i>	C		
	(b)	visible antennae	go to 4			
	4 (a)	body has a striped pattern	<i>G. lineatum</i>	A		
	(b)	body has a dotted pattern	<i>C. septempunctata</i>	B		

Question	Answer	Marks	Guidance
2(a)	a group of organisms of one <u>species</u> ; living in the same area, at the same time ;	2	
2(b)(i)	phytoplankton / algae ;	1	
2(b)(ii)	limpets / zooplankton / mussels / fish ;	1	
2(b)(iii)	phytoplankton → zooplankton → fish → seagull ;	1	

Question	Answer	Marks	Guidance
2(b)(iv)	<p><i>starfish</i></p> <p>1. (population) increases ; 2. lack of predators / fewer sharks, to eat starfish ;</p> <p><i>limpets</i></p> <p>3. (population) decreases ; 4. increased predation / more starfish or more octopus to eat them ;</p>	4	
2(b)(v)	<p>(more) hunting ; (named) pollution / contamination ; starvation / decreased food supply / competition for (food) ; disease ; more predators ; habitat destruction ; introduced / alien species ;</p>	2	<p><b>A.</b> over-harvesting / fishing (for sharks) <b>A.</b> death of starfish / octopus</p>
2(c)	(the) Sun ;	1	
2(d)	<p><b>(A)</b> condensation ;</p> <p><b>(B)</b> evaporation ;</p> <p><b>(C)</b> transpiration / evaporation / evapotranspiration ;</p> <p><b>(D)</b>precipitation ;</p>	4	

Question	Answer	Marks	Guidance												
3(a)	<table border="1"> <thead> <tr> <th>natural</th> <th>chemical</th> <th>barrier</th> <th>surgical</th> </tr> </thead> <tbody> <tr> <td>abstinence</td> <td>contraceptive pill</td> <td>condom</td> <td>female sterilisation</td> </tr> <tr> <td>monitoring body temperature</td> <td>IUD</td> <td>diaphragm</td> <td>vasectomy</td> </tr> </tbody> </table> <p>;;;</p>	natural	chemical	barrier	surgical	abstinence	contraceptive pill	condom	female sterilisation	monitoring body temperature	IUD	diaphragm	vasectomy	4	<p>8 correct = 4 marks 7 or 6 correct = 3 5 or 4 correct = 2 2 correct = 1 1 correct = 0</p> <p><b>A</b> IUD in barrier column</p>
natural	chemical	barrier	surgical												
abstinence	contraceptive pill	condom	female sterilisation												
monitoring body temperature	IUD	diaphragm	vasectomy												
3(b)	<p>hormones ;</p> <p>ovary ;</p> <p>egg cells ;</p>	3													
3(c)(i)	<p>human immunodeficiency virus ;</p>	1													
3(c)(ii)	<p><i>transmission</i> breast, milk / feeding ;</p> <p>mother to unborn child / through placenta / birth ;</p> <p>blood / blood transfusion / organ transplants ;</p> <p>injecting drugs / contaminated or sharing needles / contaminated or sharing syringes ;</p> <p><i>idea of via</i>, vaginal / seminal / sexual, fluids <b>OR</b> sexual intercourse / sex, without a condom (protection) ;</p>	2													

Question	Answer	Marks	Guidance
3(c)(iii)	<i>control</i> ref. to education ;  needle exchange / not sharing needles / use sterile needles / AW ;  free / use, condoms / femidoms ;  free testing (for individuals) ;  screening of, blood / blood products / AW ;  antiretroviral / ARV, drugs ;  <i>idea of</i> avoiding blood to blood contact ;	2	A barrier methods / protection, during sex(ual intercourse)

Question	Answer	Marks	Guidance
4(a)	<b>A ;</b> <b>C ;</b> <b>D ;</b> <b>F ;</b>	4	
4(b)	fewer / less ;  sticky ;  heavier / denser ;  spiky ;  larger ;	2	I scent
4(c)	<u>meiosis</u> ;	1	

Question	Answer	Marks	Guidance
4(d)		4	

Question	Answer	Marks	Guidance
5(a)(i)	palisade (mesophyll) ; guard (cell) ;	2	
5(a)(ii)	chloroplast ;	1	
5(b)	cell membrane circled ; cytoplasm circled ; nucleus circled ;	3	minus 1 mark for each additional circled structure
5(c)	carbon dioxide and water ;	1	

Question	Answer	Marks	Guidance
5(d)	<p><i>leaf A</i>                      bigger / larger, surface (area)                      OR                      bigger / thicker / more, mesophyll (layer / cells) ;</p> <p>absorbs more light / more chlorophyll / more chloroplasts / more gas exchange / more stomata ;</p>	2	

Question	Answer	Marks	Guidance
6(a)		3	1 mark for each correctly linked drug
6(b)(i)	66–70 ;	1	
6(b)(ii)	10(%) ;	1	



Question	Answer	Marks	Guidance
6(b)(iii)	increases and decreases / after 20 years old it decreases ; peaks in the 16–20 year old age group / AW ; any correct reference to description of fluctuation at 51–65 year olds ; data quote with units ;	3	
6(c)	bacterial ;	1	

Question	Answer	Marks	Guidance
7(a)(i)	warm, dry air ;	1	
7(a)(ii)	0.4 (mm per min) ;;	2	If no correct answer 4÷10 for 1 mark
7(a)(iii)	(air bubble) moves, further / faster ;	1	
7(b)	root (hair cell) ; by osmosis ;	2	

Question	Answer	Marks	Guidance
7(c)	(water) evaporates ; from (surface of mesophyll) cells ; water vapour diffuses ; through stomata ;	3	
7(d)	<u>xylem</u> ;	1	

Question	Answer	Marks	Guidance
8(a)	carbohydrates ; fats / lipids ; protein ; vitamins / named vitamin ; minerals / name mineral ; fibre ;	3	
8(b)	small intestine ;	1	
8(c)	(A) <u>ureter</u> ; (B) bladder ; (C) <u>urethra</u> ;	3	

Question	Answer				Marks	Guidance	
8(d)	changes in the body	urine volume		urine concentration		<b>2</b>	1 mark for each correct row
		increases	decreases	increases	decrease		
	increase in body temperature		✓	✓			
	increase in exercise		✓	✓			
	increase in water uptake	✓			✓		

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