



BIOLOGY

0610/31

Paper 3 Theory (Core)

May/June 2017

MARK SCHEME

Maximum Mark:80

Published

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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

Question	Answer	Marks	Guidance
1(a)	A – iris ; B – pupil ;	2	
1(b)(i)	(pupil / B) becomes smaller / constricts / AW ;	1	ecf
1(b)(ii)	reduces the amount of light (entering the eye) / stops too much light (entering eye) ; protects, retina (cells) / receptors / sensors, from damage / AW ;	2	

Question	Answer	Marks	Guidance
2(a)		6	<p>for each column of lines: 3 or 4 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark</p> <p>R if more than 1 line coming from a box</p>

Question	Answer	Marks	Guidance
2(b)	in the blood / in the plasma ;	1	A in the blood stream / in the blood vessels / circulatory system / in the veins / arteries / capillaries R inside any blood cell (including platelets)

Question	Answer	Marks	Guidance
3(a)	<u>1 dm³ per min</u> (ute) ;	1	
3(b)	liver ; gall bladder ; brain ; kidney ; testes ; ovaries ; pancreas ; lungs ; spleen ; uterus ; AVP ; ;	2	A any structure that is an organ A artery / vein / bone
3(c)(i)	1100 (%) ; ;	2	ecf from 3(a) $11 \div 1 \cdot 100$ or $12 - 1 \div 1 \cdot 100$
3(c)(ii)	<u>oxygen</u> ; <u>glucose</u> ;	2	either order

Question	Answer	Marks	Guidance
3(c)(iii)	<p>more energy / ATP, needed by heart muscle / it / (skeletal) muscle ;</p> <p>from respiration ;</p> <p>because (heart muscle) has to contract more, strongly / forcefully ;</p> <p>(heart muscle) has to contract, more frequently / heart beats faster ;</p> <p>(because) blood flow to (skeletal) muscles increases / blood flows faster to the (skeletal) muscles ;</p>	3	AW throughout
3(d)(i)	<p>data quote used to support either statement ;</p> <p><i>alimentary canal:</i> decreased (blood flow) / goes down / AW ;</p> <p><i>skin:</i> increased (blood flow) / goes up / AW ;</p>	3	
3(d)(ii)	<p>digestion / absorption not a priority / AW ;</p> <p>blood (volume), needed elsewhere in body / to go to the muscles / AW ;</p> <p>AVP ;</p>	1	

Question	Answer	Marks	Guidance
3(d)(iii)	1 exercise / muscles release heat ; 2 (and so) the body gets hotter / body temp increases ; 3 blood carries heat ; 4 heat lost at skin (surface) ; 5 ref to homeostasis / precise description of ;	3	

Question	Answer	Marks	Guidance
4	<u>glucose</u> ; <u>lactic acid</u> ; alcohol ; carbon dioxide ;	4	

Question	Answer		Marks	Guidance	
5(a)	<p>D / E</p> <p>D</p> <p>E</p>	<p>adaptive feature</p> <p>(canine) teeth</p> <p>large mouth / jaws / beak</p> <p>(long / strong), tail</p> <p>webbed, toes / feet</p> <p>scaly / rough, skin / has scales</p> <p>markings / AW</p> <p>eyes on top of head</p> <p>AVP</p> <p>;</p> <p>claws / nails / talons</p> <p>beak</p> <p>wings</p> <p>(tail) feathers</p> <p>forward facing eyes</p> <p>AVP</p> <p>;</p>	<p>help in survival</p> <p>seize / eat prey</p> <p>swallow / catch / grip large prey</p> <p>swimming / defence</p> <p>swimming</p> <p>prevent dehydration / waterproof</p> <p>for camouflage</p> <p>vision when submerged</p> <p>;</p> <p>catch / tear prey / perching / defence</p> <p>tear / hold food / offence / defence</p> <p>flight / search for prey / hunt / escape predators</p> <p>retain body heat / helps in flight</p> <p>to see prey from a distance</p> <p>;</p>	4	<p>feature and reason must match</p> <p>feature must be visible</p> <p>AW throughout</p>

Question	Answer	Marks	Guidance
5(b)	<p>2 → 1 → 4 → 3 → 5 or 1 → 2 → 4 → 3 → 5</p>	3	1 and 2 at start in either order 3 after 4 (somewhere) 5 at the end

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6(a)(i)	<table border="1"> <thead> <tr> <th>feature</th> <th>non-smoker</th> <th>smoker</th> </tr> </thead> <tbody> <tr> <td>length of cilia</td> <td>long / large / big</td> <td>short / small ;</td> </tr> <tr> <td>number of cilia</td> <td>many / more / large</td> <td>few / little / less ;</td> </tr> <tr> <td>size of air space</td> <td>wide</td> <td>narrow</td> </tr> <tr> <td>size of mucus layer</td> <td>thin / narrow / less / small / evenly distributed</td> <td>thick / wide / big / more / large / uneven thickness ;</td> </tr> </tbody> </table>	feature	non-smoker	smoker	length of cilia	long / large / big	short / small ;	number of cilia	many / more / large	few / little / less ;	size of air space	wide	narrow	size of mucus layer	thin / narrow / less / small / evenly distributed	thick / wide / big / more / large / uneven thickness ;	3	
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6(b)	<p>bacteria cause infections ;</p> <p>bacteria (trapped) in mucus ;</p> <p>insufficient / damaged cilia ;</p> <p>(so) mucus / bacteria, not removed / stay in / build up in, (lung / bronchiole) or mucus / bacteria, will enter alveoli ;</p> <p>AVP ;</p>	2																						
6(c)	<p>carbon monoxide ;</p> <p>tar ;</p> <p>nicotine ;</p> <p>particulates ;</p> <p>AVP ; ;</p>	2																						

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7	<table border="1" data-bbox="477 217 1193 775"> <thead> <tr> <th data-bbox="477 217 555 268">Description</th> <th data-bbox="555 217 1079 268">Name</th> <th data-bbox="1079 217 1193 268">Letter</th> </tr> </thead> <tbody> <tr> <td data-bbox="477 268 555 319">1</td> <td data-bbox="555 268 1079 319"></td> <td data-bbox="1079 268 1193 319"></td> </tr> <tr> <td data-bbox="477 319 555 370"></td> <td data-bbox="555 319 1079 370"></td> <td data-bbox="1079 319 1193 370"></td> </tr> <tr> <td data-bbox="477 370 555 421">2</td> <td data-bbox="555 370 1079 421"><i>Plumbago maritime</i></td> <td data-bbox="1079 370 1193 421">J</td> </tr> <tr> <td data-bbox="477 421 555 472"></td> <td data-bbox="555 421 1079 472"><i>Plumbago lanceolata</i></td> <td data-bbox="1079 421 1193 472">K</td> </tr> <tr> <td data-bbox="477 472 555 523">3</td> <td data-bbox="555 472 1079 523"><i>Ilex aquifolium</i></td> <td data-bbox="1079 472 1193 523">L</td> </tr> <tr> <td data-bbox="477 523 555 574"></td> <td data-bbox="555 523 1079 574"></td> <td data-bbox="1079 523 1193 574"></td> </tr> <tr> <td data-bbox="477 574 555 625">4</td> <td data-bbox="555 574 1079 625"><i>Nymphaea alba</i></td> <td data-bbox="1079 574 1193 625">G</td> </tr> <tr> <td data-bbox="477 625 555 676"></td> <td data-bbox="555 625 1079 676"></td> <td data-bbox="1079 625 1193 676"></td> </tr> <tr> <td data-bbox="477 676 555 727">5</td> <td data-bbox="555 676 1079 727"><i>Trifolium pratense</i></td> <td data-bbox="1079 676 1193 727">M</td> </tr> <tr> <td data-bbox="477 727 555 778"></td> <td data-bbox="555 727 1079 778"><i>Lupinus arboreus</i></td> <td data-bbox="1079 727 1193 778">H</td> </tr> </tbody> </table>			Description	Name	Letter	1						2	<i>Plumbago maritime</i>	J		<i>Plumbago lanceolata</i>	K	3	<i>Ilex aquifolium</i>	L				4	<i>Nymphaea alba</i>	G				5	<i>Trifolium pratense</i>	M		<i>Lupinus arboreus</i>	H	5	1 correct = 1 mark 2 correct = 2 marks 3 correct = 3 marks 4 or 5 correct = 4 marks 6 correct = 5 marks
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8(a)	breakdown of molecules ; large to small (molecules) / food to small(er) molecules ; insoluble to soluble (molecules) ;	3															
8(b)	<table border="1" data-bbox="488 435 1184 823"> <thead> <tr> <th data-bbox="488 435 958 518">name of structure</th> <th data-bbox="958 435 1184 518">letter from Fig. 8.1</th> </tr> </thead> <tbody> <tr> <td data-bbox="488 518 958 569">salivary gland</td> <td data-bbox="958 518 1184 569">P</td> </tr> <tr> <td data-bbox="488 569 958 620">anus</td> <td data-bbox="958 569 1184 620">X ;</td> </tr> <tr> <td data-bbox="488 620 958 671">large intestine</td> <td data-bbox="958 620 1184 671">W ;</td> </tr> <tr> <td data-bbox="488 671 958 722">mouth</td> <td data-bbox="958 671 1184 722">N ;</td> </tr> <tr> <td data-bbox="488 722 958 774">pancreas</td> <td data-bbox="958 722 1184 774">U ;</td> </tr> <tr> <td data-bbox="488 774 958 823">stomach</td> <td data-bbox="958 774 1184 823">S ;</td> </tr> </tbody> </table>	name of structure	letter from Fig. 8.1	salivary gland	P	anus	X ;	large intestine	W ;	mouth	N ;	pancreas	U ;	stomach	S ;	5	
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8(c)	<p><i>function of the liver</i></p> <p>production of bile ; formation of urea / breakdown of (excess) amino acids ; breakdown of, alcohol or toxins / harmful substances ; glucose converted to glycogen ; ora glycogen stored ; AVP ;</p> <p><i>function of the small intestine</i></p> <p>digestion / breakdown of food / absorption ;</p>	2	<p>max 1 from each section</p> <p>e.g. deamination / formation of cholesterol / breakdown of, red blood cells or haemoglobin / breakdown of hormones / metabolism of lactic acid / stores vitamins and minerals / formation of (named) plasma proteins</p>
8(d)	<p>protein is, digested / acted on / broken down, by protease / named protease ;</p> <p>protease from, stomach / pancreas / small intestine ;</p> <p>(digested to) polypeptides / amino acids AW ;</p> <p>acid conditions in stomach ;</p> <p>alkaline / neutral conditions in small intestine ;</p> <p>AVP ;</p>	4	<p>e.g. activation of enzymes</p>
8(e)	<p>oral rehydration therapy / AW ;</p>	1	

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9(a)(i)	X = epidermis ; Y = palisade (mesophyll) ;	2	R lower epidermis I cuticle I mesophyll unqualified R spongy mesophyll																				
9(a)(ii)	to let light through / light can reach, (palisade) mesophyll cells / chloroplasts ;	1																					
9(b)(i)	Z = stoma ;	1	A stomata / guard cell R stroma																				
9(b)(ii)	<u>diffusion</u> ;	1																					
9(b)(iii)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th colspan="3">movement of gas</th> </tr> <tr> <th>name of gas</th> <th>into leaf</th> <th>out of leaf</th> <th>no movement</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide</td> <td>✓;</td> <td></td> <td></td> </tr> <tr> <td>oxygen</td> <td></td> <td>✓;</td> <td></td> </tr> <tr> <td>water vapour</td> <td></td> <td>✓;</td> <td></td> </tr> </tbody> </table>		movement of gas			name of gas	into leaf	out of leaf	no movement	carbon dioxide	✓;			oxygen		✓;		water vapour		✓;		3	
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